V.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON FORENSIC MEDICINE

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

---

1. Death caused by exposure to excessive heat, and from combustion.

Effect of heat.

Regierungs-Rat (Government Counsellor) BUETTNER

The large number of fire catastrophes in aerial warfare can be explained by the fact that the enemy finds the means of warfare by fire available, which he has only to ignite. Each flame has at its base glowing parts which emit gas, by which it keeps itself supplied as by a gas-works. The flames of wood-, petrol, and oilfires show temperatures of about 600 - 800 Celsius degrees. Much higher temperatures are found with metal fires such as the incendiary bombs, with which temperatures may increase to 3000 Celsius degrees. Only a slight part of the radiant heat emitted is visible, and in such a way that e.g. at 700 Celsius degrees red heat and at 1100 Celsius degrees yellow heat is shown. For feeding the fire, immense quantities of fresh air are needed which are conveyed from the side and from below as the so-called "torrent of flames". This air is primarily cold, pure, and rich in Oxygen. A scarcity of oxygen in the center of the fire is, therefore, improbable. The term "Feuersturmleiche" is misleading, since these people are mostly killed not by the "torrent of fire", but by radiant heat.

The heat acts on the human body by conduction and convection of hot air, by contact with solid and liquid matters, by condensing vapors, but above all by radiation. The effect of the hot air increases with the velocity of the wind. Practically, however, it obtains dangerously high values only in closed rooms and immediately over the flame. The combined effect of the humidity of the air, the proportion of dust and foreign gas is in this case generally insignificant in our climate.

For physical reasons (in consequence of the steeply rising curve of the transmission of heat with increasing temperature) as well as from the way in which the fire is built up (hot air above) the result is that the main transmission of heat takes place by radiation. The intensity of the absorption of radiant heat is determined by the temperature and the expanse of burning surfaces (calculated from the angle of vision of the observer) and by the absorption coefficient of skin and clothes. Clothes and skin have practically no capacity of reflection nor perviousness to the radiation of heat. Polished metals, however, prevent the effect of radiation by a nearly total reflection.

With each testing of the effect of heat and the protection against heat it must be clear what the various conditions are. In particular the relative effect of hot air and radiation must be defined. e.g. if the supply of calories and the temperature of the skin are the same, the hair on this skin in case of a calory supply with hot air, will be considerably hotter than the skin, while in case of radiation they will be colder than the skin.

A protection against the effect of heat is primarily afforded by any kind of clothing as it makes possible a fall of temperature from the hot outside to the inner side, according to its insulation against heat. The desirable high insulation for heat does, however, increase the probability of catching fire with clothes which do not consist of pure wool or silk. Wet clothes and blankets are a protection by the cooling caused by the evaporation of the water, but only so long as they are wet.

Fire-proof clothing of polished metal is founded upon a completely new principle. The very thin layer of aluminum spread on cloth or paper, reflects 80 to 90 per cent of the radiation striking it, prevents an adherence of sparks by its smoothness, automatically protects the upper garments, and is to be developed into protective clothing against mustard gas for civilians, by order of the Inspector of the 13th Air Group Command.

Comparative experiments before a burning barn with an air temperature of 14 C. degrees and a radiation of 5 - 10C Kcal/m^2hour, produced by a wood fire of 6 - 800 C. degrees over a large surface at a distance of 3 meters had the following effect: A man, without protective clothing, with steel helmet and respirator, retires immediately; a man covered with a wet blanket, after 18 minutes the blanket is charred in front, the man very much exhausted. A man clothed in the asbestos suit of the fire brigade: temperature on the outside of the asbestos suit more than 180 C. degrees after 28 minutes, on the upper garments 90 C. degrees, the man very much exhausted. A man dressed in clothes with a coat of aluminum foil (0.008 millimeter) on parachute silk: temperature on the outer surface 54 C. degrees after 28 minutes, on the clothing 32 C. degrees, the man quite fresh; pieces of leather and cloth are charred, the glasses of the gasmask are bent.

2. Death from exposure to excessive heat.

Oberstabsarzt (Major, MC.) Prof. PONSOLD

The temperatures causing death from exposure to heat begin at 50 C. degrees at which point the skin is blistered, and at 60 C. degrees necroses occur. Effects of heat on the hair are to be recognized from about 150 C. degrees onward, particularly about 200 C. degrees. It consists in discoloration, curling, brittleness, and dilatation of the air slit. The hair is not suitable for a differentiation of vital or postmortem changes.

In order to ascertain coagulation of the blood the condition of the blood of the right ventricle of the heart must be examined by using the hematocrit. The routes of entrance and exit of the heart are to be closed up carefully during the examiantion.

3. Effects of heat on the respiratory passages.

Prof. A. FOERSTER

The speaker reports on changes of the mucous membrane of the trachea which he observed with burnt persons. The microscopic examination of the epithelial cells showed swelling of the epithelium such as may be found at the place where the electric current enters. These changes must therefore result from the inhalation of overheated air. The experiments made in this respect proved the assumption. For this purpose oxygen and hydrogen were exploded, and at the same time a fire was produced by the explosive substance. Thus overheated air developed which was inhaled by the animals. This caused the changes of the epithelium of the mucous membrane of the trachea, or a fixation of the cells by coagulation of the plasma. This observation certainly is of importance in the large scale air raids, for in this case too explosions occur which cause fires, and in this case too overheated air develops which men are obliged to inhale. It must be assumed, therefore, that during large scale air raids, besides poisoning by carbon monoxyde and laceration of the lungs, inhalation of overheated air also plays a part in certain cases.

4. Death from burning.

K. H. ZINCK

Findings of recent and earlier dates are shown by demonstration of fine tissues of burnt and scalded persons. Also, according to the new material of research of ZINCK, there occurs in connection with the burning a primary attack on the vascular system, which becomes pervious to blood plasma containing albumin and leads thus to a loss of plasma wit coagulation of the blood, and finally to collapse. In the organs obviously depending upon their function (ROESSLE), serous inflammation may occur, which, with large parenchymal losses, may cause injuries to the organs that may have fatal results. In early cases the intense edema of the brain with a hyperemia and a corresponding increase of the pressure in the brain are the cause of death. The adrenal gland has no central position with regard to a primary attack by poisons of albuminous disintegration. It may, however, be exhausted functionally, just as the basophilic portion of the hypophysis may become fairly empty and edematous in the case of death by burning.

In the case of hepatic and renal involvement death occurs not rarely with the clinical picture of hepato-renal insufficiency. Disturbances of function pass over into anatomical injuries with burning. The morphological examination reveals which areas have been affected first and the nature of the attack. With extensive injuries of the organs a secondary additional endogenous disintegration of albuminous poisoning follows upon the primary one (vicious circle).

In early cases attention is to be paid to:

1. Brain (edema and hyperemia);
2. Liver (cloudy swelling, dissociation, necroses);
3. Kidneys (necrotic nephropathy, calcification, hyaline degeneration);
4. Heart and vessels (erythrocytorrhexis, hyaline fibrinballs);
5. Blood (fixation Carnoy and Formalin).

In late cases:

1. Liver and kidneys,
2. Heart and blood vessels,
3. Brain (ganglion cells),
4. Hypophysis and suprarenal glands (basophilia).

5. Effect of fire-storm on the human body.

Oberfeldarzt (Lt. Col., MC.) of the Police KRAEFFT

The observation given in the preceding reports concerning the injuries to heart and causes of death during fires over large surfaces are confirmed. The opinion expressed by laymen that a deficiency of oxygen near large fires has led to death in many cases, is disproved by the fact that any deficiency of oxygen should lead necessarily to an accumulation of carbonic acid and that the poisoning by carbonic acid should be one of the prevailing phenomena. This fact, however, could in no case be proved to be the cause of death.

Discussion following the lectures on death from exposure to excessive heat and burning.

FOERSTER: The same changes can be produced in the lungs postmortem though only in the area where the effect of heat took place.

BUETTNER: Concerning the question of the inhalation of hot air, the following personal observation by the author at 200 - 250 C. degrees shall be mentioned. The sensation on the face is very disagreeable, injuries do not occur probably on account of the already present supply of sweat, except one burn at the spot where the spectacles, covered with an insulating substance, rested. The respiration was not rendered disagreeable nor any more difficult, except that the heat badly affected the edges of the nose.

A curve of the time for which the heat can be tolerated ("Hitzefluchtzeit") is shown, that is to say for that period during which the complete physical and mental capability of action is still more or less unimpaired dependent on the effects of the temperature of the surrounding area. The curve is based on observations between 50° C. and 250° C. and on calculations based on the following facts: the required capacity for action decreases, if the body temperature and the temperature of the skin continue to increase correspondingly, and if the body temperature has increased at least one degree as compared to the temperature at the starting point. Moreover the apparently highest possible peripheral blood supply and the normal development of the warmth of the body and clothing are assumed. The time for which that can be tolerated is e.g, for 50° C. - 3 hours, 70° C. - 1 hour, 130° C. - 15 minutes, and 250° C. - 3 minutes.

BUHTZ: Reference is made to the vital and postmortem changes by the effect of heat, to the need for exact quantitative spectroscopic and spectral photometric examinations (LOEWE-SCHUMM, KOENIG-MARTENS). Cerebral sclerosis with necrotic hematoma caused by negative pressure in the cranial cavity and vacuum are to be considered as postmortem phenomena. In the case of cracks in the skull caused by the effect of heat, it is often wrongly attributed to a blow inflicted with a blunt instrument.

OSTERTAG: If there are no well-known assumptions based on experiment, the number of unknown factors is so great that an indisputable determination of the cause of death is impossible.

The rapid postmortem changes make a solution of the problem difficult.

In unusual cases one must try to find out what materials had been stored in the buildings, which of all these materials were thus changed by the effect of heat, fire, or water, so that a fatal effect may have been produced early. Death by carbonic acid is certainly not sufficiently taken into consideration, just as little as the effect of gas from defective sewers.

For an explanation of all these questions it is therefore necessary:

1. To take into consideration the clinical observation of those who have survived,

2. To ascertain exactly the local conditions,

3. To carry out the postmortem examination as soon as possible.

MUELLER: The bloating of the dead body probably takes place by the formation of vapor. After the decrease of temperature or after the bursting of a body cavity the bloating decreases.

AMMICH: The frequent very impressive cerebral edema occurring rapidly, and leading to sudden death, may also become intense and may be of long duration without becoming the immediate cause of death. A case out of my own practice, of a burn of the abdominal walls by the explosion of a hand grenade, with subsequent death as a result of fecal peritonitis, 2½ days after the accident, with most serious cerebral edema, signs of cerebral pressure and hyperemia of the leptomeninges is mentioned. In this case symptoms of a central cerebral death were not present.

GRAEFF: A small number of deaths in the fire-storm can probably be explained as immediate death by burning. The question, as to whether death by deficiency of oxygen is really possible I leave open. For the vast majority of deaths exposure to excessive heat must probably be regarded as the cause of death. Numerous reports registered by me of the experiences of persons escaped from fire-storm showed that part of them had perspired freely and had quenched their thirst as soon as possible with any kind of water, while the other part has neither perspired nor had they afterwards felt particularly thirsty. This fact makes one suppose an influence upon the heat center (mid-brain) and indicates with this kind of fatality that death resulted from heat in the manner of heat stroke. Also the quick recovery of those saved without any secondary symptoms (no headaches as there are after poisoning by CO) points in this direction.

Directions on death caused by exposure to excessive heat and burning.

1. Blisters (size and position).

   a. This sign is only of value if there are no blisters caused by decomposition.

   b. On the dead body, however, blisters may form, but in this case, these are gas blisters. If they contain liquid, leucocytes are absent.

2. Vascular marks.

The corium tightly filled with detached epidermis in consequence of a coagulation of blood accumulated by hyperemia due to excessive heat.

This phenomenon does not concern the dependent parts of the dead body, since in them the blood vessels are filled by hypostasis (within the livid spots).

3. CO - hemoglobin in the blood of the heart.

This finding has value only when the quantity of CO - hemoglobin is below 50 per cent. With higher quantities of CO - hemoglobin death may be caused by CO - poisonings. Therefore, the quantity of CO - hemoglobin should be ascertained. The blood should be transmitted in small hermetically closed ampules, filled up to the brim.

4. Soot in the trachea and in its smaller ramifications.

This phenomenon is of value only if it occurs during the burning and not before it e.g. smoke (soot) has been inhaled if during the attempt to escape from the flames.

5. Soot in the stomach.

Objection as under Nr. 4.

6. Fascicular arrangement of the bronchial epithelium between the honeycombed blisters caused by heat.

This is a phenomenon caused by heat, since the respiratory passages are protected and "honeycombs" develop as a rule only by inhalation of superheated air.

7. Fat embolism in the lungs.

Points to a trauma or scalding.

8. Local effect on blood vessels.

With burnings and scaldings which have been survived for a short time, a serious injury of the vessels occurs by a probable "resorption of poison". Even within a few hours histological changes of the organs are found. Early death is mostly caused by cerebral edema (increase of cerebral pressure), in some cases a single injury of the organs may be fatal (e.g. serous myocarditis).

6. Death caused by dust.

Stabsarzt (Captain, MC.) DESAGA

The fatal conditions of suffocation by inhalation of dense concentrations of dust are discussed. Suffocation by dust during an air raid is very seldom observed to be fatal. The original report is published elsewhere and may be obtained from the Aviation Medical Research Institute of the National Air Ministry (Luftfahrtmedizinisches Forschungsinstitut des RLM, Berlin).

Discussion:

BAADER: When the aircraft disaster occurred in Antwerp I was some hours later at the spot where it had happened. The corpses were thickly covered with dust. The children who were found still alive had been protected by the skirt of a nun, like chickens covered by a hen; but soon afterwards they died too.

ROESSLE: Death by dust is referred to in which case the larynx and the whole trachea were filled with gray soft mucous mortar, probably inhaled dust, soaked in edema. In these cases the mass should be gathered and weighed in moist and dry condition in order to ascertain in what quantities it becomes fatal to man.

BREITENECKER: In the Vienna Institute for Forensic Medicine a case of death by dust was observed some years ago, which occurred when a coal miner, against the regulations, advanced to a coal slide and looked up in order to see whether the coal car was discharged at the upper end of the slide and the coal rushed down, raising an enormous cloud of coal dust. The miner afterwards was found suffocated by coal dust. In this case one could speak, therefore, of death caused by dust.

7. Carbon monoxide poisoning and detection of CO.

Oberfeldarzt (Lt. Col., MC.) Prof. LAUCHE

The causes of fatal CO poisoning among soldiers.

A report is given on the evaluation of the reports by the sections of army pathologists concerning fatal but unintentional CO poisoning (that is to say excluding suicides) based on the material of the Report Collecting Station controlled by the Consulting Pathologist of the Military Medical Inspection Service. The tables shown are based on the evaluation of the reports made by U. A. DOEHNER. They are intended to give a survey of the causes of CO poisoning, therefore, the comparative numbers were given without calculation of any average values.

There were poisonings by:

I. Illuminating gas, 34 per cent; II. Charcoal fumes, 37 per cent; III. Motor exhaust gases, 14 per cent; and by unexplained and other rare causes, 15 per cent of unintentional deaths by CO.

Ad. I. Most frequent are deaths causes by irregularities in the operation of gas water heaters (20.5 per cent) and through carelessness (2.3 per cent), defective waste-pipes for the combustion gas (8.2 per cent), defective stoves (1.2 per cent), and unexplained primary causes (8.8 per cent). 5.3 per cent of the accidents were caused by gas heating stoves, 0.6 per cent by gas cooking stoves. 3.6 per cent by open gas taps, 1.8 per cent by defective gas pipes, and 0.6 per cent the bursting of gas pipes underground.

Ad. II. The "charcoal fumes" (poisoning by smoke fumes) mostly developed from stoves operated in a faulty manner (16.4 per cent), also from fires outside the stove (4.7 per cent), which mostly on account of drunkenness, were not detected in time. Burning of the bed when smoking in bed (in most cases also under the influence of alcohol), was found to be the cause in 1.2 per cent of the cases. The full particulars could not be ascertained in 15.2 per cent of the cases.

Ad. III. Poisoning by motor exhaust gas was due to the very common bad habit of letting the motor run 1) in closed rooms (2.4 per cent), 2) in the open air, but with the car closed (6.0 per cent). In 4.1 per cent of the cases death was caused by the escape of gases containing CO into the car through leaking exhaust pipes. Unknown as regards particulars remained 2.4 per cent.

The causes were the same as those known to doctors in peace-time, lack of thought or carelessness and drunkenness often playing an important part. A decrease of accidents is to be attained only by continuous instruction as to the imminent dangers and severe punishment for the non-observance of the regulations. Causes which were characteristic for the Armed Forces and would require new regulations could not be found. New pathological anatomical observations worth mentioning, were not made.

8. Poisoning by carbonic monoxide.

Oberstabsarzt (Major, MC.) Prof. BUHTZ

Poisonous substances:

a. Gas from fire,

b. Illuminating gas,

c. Technical gases containing CO,

d. Poisonings by several substances (CO + CO_2, CO + nitrose gases).

Since the known clinical and pathologic-anatomical changes due to acute poisoning by carbon monoxide afford no proof but only an indication, the objective proof must be adduced in surviving cases, particularly, however, in rapidly fatal cases of CO-poisonings:

1. By reconstruction of the circumstances (particularly examination of the place of occurrence),

2. Demonstration of carbon monoxide in the blood by means of physical or chemical methods (see report by BREITENECKER).

As a rule it is only with protracted poisonings by carbon monoxide and escaping, that the well-known symmetrical focuses of softening in the lenticular nucleus can be cited as objective arguments.

Statistics:

Accidents were mainly caused by gas from fires and technical gases, a smaller number by illuminating gas.

During air raids deaths occurred by gas from fires as well as by illuminating gas (destruction of gas pipes).

Murder by illuminating gas was rarely observed, by gas from fires in some cases. Poisonings by gas from fires were more frequent in the country, poisonings by illuminating gas more frequent in town.

The number of cases of poisoning by gas from fires, apart from large scale air raids, varies according to the seasons, corresponding to the heating period.

Poisonings by illuminating gas, apart from large scale air raids, on account of the frequency of suicides, vary according to the seasons, corresponding to the suicides by general poisonings used in the household and in trade.

Suicide by illuminating gas is the prevailing method with females.

The concentration in corpses with poisoning by illuminating gas 21 - 81 per cent, on an average 49.8 per cent, with gas from fires 20 - 80 per cent, on an average 43 per cent.

With illuminating gas the distribution in the organs is equal, with gas from fires there is a strikingly high percentage of it in the kidneys.

With illuminating gas 99 per cent of the death spots are light red, while with gas from coal fires only 68 per cent are light red.

Causes of injuries to health and deaths by illuminating gas.

A. Accident.

Defects of pipes caused by air raids, taps and tubes partly opened or leaking.

Leaky plugs or connections of gas pipes.

Falling off of rubber connecting tubes.

Accidental tearing off of the rubber tubes in fainting fits, attacks of vertigo, and other fits.

Extinction of the flame caused by draft or boiling over.

Extinction of the flame of the water heater, radiator, or gas range.

Lowering the flame too much (putting on too large a pot filled with cold water).

Absorption of the odorous substances by steam, (bath, sauna) or with poisoning by escaping gas (bursting of gas pipes and others).

B. Suicide.

Opening of taps, perhaps combined with taking soporifics.

Killing oneself and one's whole family.

Simulated suicide (Simulation of accident).

C. Murder.

Fictitous suicide.

Combination with soporifics and other poisons.

Dislocation of gas pipes, of rubber gas tubes which pass through the walls of inhabited rooms.

Injuries to health and deaths from gas from coal fire.

A. Accident.

Gases developed by fires during large scale air raids.

Defective or damaged chimneys of heating installations.

Defective stoves (Stoves made of Dutch tiles), unsuitable heating materials, coal.

Stove doors closed too soon (wrong manipulation).

Stove doors, stove pipes, flues and chimneys defective or not tightly sealed.

Choked or closed flues and chimneys.

Defective introduction of flues into stoves and chimneys (torn off flues).

Faulty installation of stove pipes, flue for the smoke adjacent room, room in the upper floor).

Deaths in garages with wood gas generators on autos.

Crude coke stove in the bed room.

Stove with slow burning fire (joined to normal chimneys).

Soot obstructing the draft of the stove and the chimney.

Difficulty in venting the smoke gases caused by residual ashes and chimneys blocked by snow.

Back pressure of waste gases of a gas hot water heater.

Closed damper in stove pipe.

Faultily installed flues, introduction of stove pipes into ventilation ducts.

Gas escaping from small leaks.

Influence of the weather on the draft of the chimney (defective petroleum stoves).

Coke stoves, e.g. marmalade tins, in closed rooms (cellar, bunker, in thawing out water supply pipes).

Installation of heating stoves in motor cars.

Live coals falling out of stoves and setting fire to the room.

Hot slag.

Fire brigade (salvage).

Coal stoves in auxiliary hospital trains, service- and frontleave trains, sauna.

Smouldering of combustible material near the stove (wood, clothing, linens).

When kindling fires (with gasoline) the clothes and other substances catch fire.

Upsetting of lamps (stable lantern, candles) with spread of fire to surroundings.

Smoking in bed (fires in beds), occasionally by hot bricks.

Discarding live matches with resultant smouldering fires (burning of rooms).

Sleeping close to or on the stove.

C. Murder.

Stopping up of the flues, coal pans.

By charcoal fumes in closed bath rooms (murder of the stepchildren).

Injuries to health and deaths due to technical gases containing CO.

A. Accident.

Large scale air raids (gases developed by fire).

hot slag, poison gases.

"Pioneer disease" of miners (CO).

"Limousine disease".

Death in garages (cold air).

Heating with exhaust gases, leaky pipes.

Suction of exhaust gases.

Accumulation of gas in insufficiently ventilated rooms.

Driver's seat of trucks propelled by gas produced from wood.

"Maultier", (poor venting of the exhaust gases).

Tunnels.

B. Suicide.

Dissimulated suicide in garages.

C. Murder.

Preparation and administration of CO from formic acid HCOOH by the action of H_2SO_4.

Murder in garages.

Concurrent causes of death.

Natural death, poisoning by alcohol, soporifics, CO_2, CH_4, death caused by excessive heat, lack of oxygen.

1. Recognition of poisonings:

a. acute
b. chronic (exhaustion, headaches).

Exact clinical examination of the blood.

2. Erroneous diagnosis of poisoning.

Most frequent when caused by illuminating gas and gas from coal fire. Confusion with poisoning by foodstuff and by soporifics.

Causes of mistakes.

False history (careless, intentional, to protect criminals). No history in case of death or unconsciousness. No inspection of the place where crime was committed (often reluctance of the physician to inspect the place where crime was committed; with heating installation, test heating). No proper postmortem examination of the body (light red death spots overlooked, since the body was not undressed). When gas from coal fire is the cause, often no or only a few light red death spots.

No blood tests sent in (blood samples not to be taken from vessels near the surface on account of a danger of diffusion from atmosphere containing CO). Blood must be taken immediately from the survivors, since otherwise the test becomes more difficult on account of the subsequent secretion.

There must be no prejustice!! The examination must be made without prejustice and everything must be considered. Examination of the place where the crime was committed (cause, tests of air! Poisoning by carbon monoxide is often not suspected, because no odor was observed on account of

a. strong dilution,
b. filtering off of the odor in case of escaping gases,
c. absorption of the odor by steam,
d. soporifics,
e. intoxication by alcohol,
f. unconsciousness.

3. Prophylaxis.

a. Proper heating installations and supervision is imperative especially at the beginning of the heating season. (Bunker, Panje cottages, etc.).

b. Proper attention to the fire (instruction concerning the method of heating and the kind of fuel).

c. General instruction concerning the dangers (particularly at the beginning of the heating season). The bunker must be left in time during air raids (canary).

9. Testing for carbon monoxide.

Dozent BREITENECKER

After a survey of the methods of testing for CO in the air the use of salts of palladium, gold and silver, by the oxides of manganese, copper, mercury, cobalt, silver and chromium or mixtures of these, particularly by iodine pentoxide and the filters of gas masks constructed according to these processes as CO-gas detector apparatuses and CO-measuring apparatuses of the "Draeger Werke", in the "Auergesellschaft" and others, the question of ascertaining the content of CO in the blood was discussed.

The qualitative testing is done best by means of spectroscopic examination, for which purpose a hand-spectroscope is quite sufficient. Sodium hydro sulfate ($Na_2S_2O_4$) is recommended as a reducing agent which acts more quickly, and which is solid and more stable than ammonium sulfide, such as is laid down in Army Manual 396, Navy Service Manual 318, and German Air Force Service Manual 96. The lower limit of detection by this method is about 20 per cent of CO-hemoglobin. But less than 40 per cent of CO-hemoglobin must be ascertained by the quantitative method.

The quantitative proof can be carried out by means of the gas-analytical or physical method. Among the former methods the best seems to be the iodine pentoxide method (MAY, FISCHINGER, SCHMIDT). Among the physical methods we mention the spectrometric, the colorimetric, the comparison photometric, the spectral photometric, and the infrared photometric method. Among these the methods of MAY, RANKE, and SEYDEL with the comparison photometric apparatus are to be recommended for prophylactic examinations, or the examination of survivors, while the spectral-photometric method is suitable for the examination of blood of every kind, from the living person or the dead body even in case decay has set in or there has been partial combustion of the body. Therefore, this method is recommended first and foremost, particularly, as only a few drops of blood are sufficient for an examination and the control takes only 5 minutes. These methods are adequate down to a lower limit of about 2 per cent. Smaller quantities must be ascertained by gas-analysis but they are irrelevant to our question.

If there are survivors, it is important that their blood should be taken then and there, and sent in for examination, with an accompanying letter giving particulars of the poisoning, stating when the person concerned was found and the blood taken, also mentioning symptoms of the disease. In the blood taken or in extravasations, CO can be ascertained for a long time, in the circulating blood it is quickly excreted by the respiration (on an average after 10 hours). In corpses CO can be ascertained even after months have elapsed. The blood should be without admixture of any substance and should be placed in small tubes, brimfull and closed tightly. With beginning decay, the stopper must be fastened so that it cannot be blown out by the gases of decomposition.

In conclusion it is pointed out that it is possible to diagnose CO-poisoning from the pathologic-anatomic findings, even when the dead person has survived the poisoning for more than 10 hours so that the CO has been excreted again from the body, except for such small quantities that they are difficult to demonstrate.

Discussion about the reports concerning poisoning by carbon monoxide and the proofs of the presence of carbon monoxide in the body.

GRAEFF: The value of the quantitative determination of CO-hemoglobin in corpses shrunk by combustion after bombardment is frustrated by the fact that with these corpses the local heating of the organs makes it possible to demonstrate CO, or because the hemoglobin is destroyed by putrefaction.

BUHTZ: With corpses which have been in the CO-atmosphere for a comparatively long time, the taking of blood from deep lying vessels (cavity of the brain) is required, because of the possibility of postmortem diffusion.

In case of mass-poisonings blood tests must be made immediately and marked separately with the names of the persons concerned.

In case of mass-poisonings in the same room the most widely variable percentages of CO were found.

Concerning the micro-spectroscopic method, the microscopy according to LOEWE-SCHUMM gives valuable results only down to 20 per cent. Smaller quantities below 20 per cent may be ascertained spectrometrically by means of the apparatus of KOENIG-MARTENS.

Decreased oxygen plus CO_2 must be considered in the differential diagnosis.

BAADER: In bunkers of the "Atlantic Wall" ("Atlantic Fortification") furnished with iron patent stoves, poisoning by CO (among them some fatal cases) were observed, though the stoves were being attended according to the instructions. The flue for the gases of the stoves is connected direct with the hand-grenade pit of the bunker. Control tests have shown that if the wind is in the direction of the hand-grenade pit, the waste gases of the stove are blown back into the bunker.

MUELLER: In northern Russia and in the Eastern territory a poisoning by CO does not occur with wood heating, even when the stove-register is closed; it does, however, occur, when coal or coal mixed with wood is exceptionally used and when the stove damper is closed too soon.

WIETHOLD: Report on cases of poisoning by CO in the open air and in bomb-proof shelters, the latter by pumping air containing CO into the bomb-proof shelter. Remarks concerning the estimation of CO in the blood.

FLURY: In case of poisoning by mixtures of CO (gases developed by fires, exhaust gases, smoke) the percentage of oxygen in the air mixtures plays an important part. Lack of oxygen increases the CO danger to a high degree, while the admixture of CO_2 is of little importance as gas which furthers the respiration. (Recent investigations by O. KLIMMER, Wuerzburg).

Directions regarding poisoning by carbon monoxide.

1. When measures are taken immediately samples are to be taken at random from corpses in various rooms.

2. Blood from deep-seated vessels (heart, meningeal sinurs, kidneys, pelvis), or extravasated blood, bloody liquid or pieces of tissue filled with blood are to be sent in for the purpose of quantitative proof of CO. Organs too much boiled, or roasted, or carbonized, are useless. Of juveniles also the hollow cylindrical bones are to be sent in.

3. The tubes must be filled up to the brim, with the test material (blood etc.) and must be closed tight (cork or rubber stopper).

4. The nearest test institute or auxiliary test institute must be well-known to the chief of the research group for the ascertainment of doubtful causes of death during air raids.

5. With survivors blood must be taken as soon as they are found, because of the rapid excretion of the CO.

6. Information must be given to the competent examination department about the place where bodies were found and, if possible, an anamnesis including a sketch of the place where the accident took place.

7. For quantitative CO test any practical physical method available is useful.

8. Statements should be made about the result of the determination of CO in the blood or the percentage of CO-hemoglobin. Statements of cubic centimeters in the blood should be avoided, they must be converted into per cents of CO-hemoglobin. The results of the experiment must be given to the chief of the research party.

10. Self-inflicted injuries.

Oberstabsarzt (Major, MC.) Prof. MUELLER

If a soldier intentionally injures himself so as to shirk duty, this is a case of self-mutilation. If he injures himself through negligence, it is to be called mutilation through negligence. The cases of mutilation through negligence are handled in the following manner: The army surgeons, the physicians at the main dressing stations, and the physicians at the hospitals send every case of unaccountable injury, in which self-mutilation may be a consideration, to a hospital where a consultant in forensic medicine is attached. By including so many men for examination to detect the real cases of self-mutilation, the examination of many innocent men is inevitable. Any defamation of the soldiers to be examined is, therefore, strictly avoided. During the examination attention is first paid to injuries caused by close-range shots. Burnings are practically out of the question with close-range shots from modern weapons, just as is the presence of particles of powder in the wound. Near the spot where the bullet entered the textile fabric is sometimes roughened and of lighter color with close-range shot from a distance up to 10 centimeters. In this case it is the question of a loosening of the fabric by gas pressure. Its presence is a sign of a close-range shot and besides this a sign that a flat trajectory weapon was used. Tears in the textile fabric are found with shots from small arms up to 12 centimeters. The skin breaks at a distance of up to 2 centimeters. A gunshot wound where the skin is broken is an important sign of a close-range shot when a breaking of the skin by a fracture caused by a bullet is out of the question. The most important sign of a close-range shot is the edge caused by the smoke of the powder which can usually be diagnosed macroscopically. If a macroscopic diagnosis is not possible because the shot was fired at comparatively close range or if the textile fabric is soaked with blood, the examination must be made by means of "Dithizon" reaction. A microscopic diagnosis of the powder smoke is very difficult. According to the speaker, it is justified only in exceptional cases. The edge of powder smoke must not be mistaken for an edge caused by grazing or by dirt. If the hand of the soldier was dirty, the secretion of the wound, the blood, and the dirt combine to a blackish crust which may be mistaken for powder smoke. Russian explosive incendiary cartridges do not generally cause phenomena which could be mistaken for signs of close-range shots. There is, however, one exception, namely if the hand of a soldier was just touching wood. The explosive incendiary cartridge penetrates the hand without detonation. It detonates only in the wood. The powder smoke is at the spot where the bullet leaves the hand. The particles of the bullet are not in the hand, but in the wood. According to current opinion tracer incendiary cartridges do not cause noticeable changes at the spot where the bullet enters the body. Spent tracer cartridges cause a lining of the channel with smoke. Two experiences in practical cases, however, raise the question, whether for once a tracer cartridge may not leave a trace of smoke around the spot where the bullet entered. Special examinations are going on.

In case of filter shots a diagnosis is easy if the filtering object is found (folded handkerchief, "Hindenburglicht", bread, trunk of a tree). Otherwise diagnosis is only possible if traces of the filtering object can be proved macroscopically or microscopically at the spot where the bullet entered the body, which was sometimes done successfully.

If a soldier asserts that the wound was caused by a long-range shot, while it was actually due to a close-range shot a self-mutilation must be suspected. Recently, however, the cases increase in which soldiers, who are mentally normal at first pretend that they were wounded by a long-range shot, though the wounds are due to careless self-mutilation through negligence. In the instructions on self-mutilation sometimes a sharp distinction is made between self-mutilation and mutilation by negligence. By this soldiers are sometimes frightened and at first tell foolish lies. Such conduct can now no more be regarded as positive circumstancial proof of self-mutilation.

The descriptions of the accidents must be demonstrated and put down carefully in writing. After that inquiries at the unit must be made. If a self-mutilation is to be suspected th case is submitted to the military court. If it can be proved that the soldier is found not guilty the unit is informed of it A copy of the findings is added to the medical report in order to prevent a resumption of the cases by another hospital.

The results of the proceedings at law are sometimes difficult to foresee, since the military administration of the law is somewhat unstable. Generally the judges examine the circumstances very carefully. Sometimes there are surprising acquittals, particularly if the defendant makes a good impression and bears a good character. Therefore, the soldier had best make a confession in the course of the trial. Although it is not the special task of the medical expert to obtain confessions, he will be bound in duty to put down in writing the confession immediately if it is made spontaneously, and to avoid suggestive questions during the examination. Otherwise he risks a later disavowal of the confession.

The self-mutilators may be divided into two groups. Some of them commit the deed in a fit of emotion (bad news from home, severe enemy attacks, death of comrades). They make no preparations for later excuses and soon confess everything. The second group consists mostly of veteran soldiers who are weary of the war. They make cunning preparations, think out elaborate excuses and are usually found out only by chance.

The number of self-mutilations has increased only moderately since the appointment of consulting medical officers for forensic medicine. Their greater increase in the beginning is to be accounted for by the fact that the organization of the methods of detection was improved considerably later on. Self-inflicted injuries through negligence constitute a large proportion of the total number of examinations. Among these genuine cases of self-mutilation are hidden which cannot be proved with sufficient certainty. A discussion of this question is suggested; whether the possibility of legal punishment for mutilations through negligence should be obtained by a change of the laws. To differentiate between a deed committed deliberately and one committed through negligence is rather difficult. Disciplinary punishments are not always sufficiently severe.

11. Chemo-technical examinations as a means to prove self-mutilations.

Stabsapotheker (Captain, Pharmacy Corps) MAYER

A report is given on the steps of analytical examination in proving chmical artefacts. The analytical course was worked out in the Institute for Military Pharmacy and Practical Chemistry of the Army Medical Academy, Forensic-Chemical Section. In the wound crusts of cauterized animals cauterization agents could be proved commonly after 1 - 2 weeks. In order to prevent contaminations of the examination material, it is recommended that the specimen be sent in the state in which it is has been excised, instead of preserving it.

In the second part of the report the chemical methods for ascertaining close-range shots were critically examined. The ascertaining of lead by means of "Dithizon" as the only chemical proof of a close-range shot is considered to be insufficient and as too little characteristic. The spectral analysis, by means of which all elements (substances) of a close-range shot can be proved objectively and accurately is described. As elements of a close-range shot all metals characteristic of a close-range shot are to be regarded. They are chiefly the metals of the detonator such as lead, antimony, barium, zinc, and tin. By means of the spectral analysis the powder smoke of close-range shots can be distinguished from the powder smoke of tracer and incendiary ammunition which is due to long-range shots.

Spectral analysis is recommended as means of securing the most exact proof of a close-range shot.

12. Malingering.

Oberfeldarzt (Lt. Col., MC.) Prof. BAADER

Malingering presupposes two things: firm will and skill of the malingerer and credulity and ignorance on the part of the physician. By the leaflets of the enemy propaganda (e.g. the so-called sporting-regulations for the Navy) the enemy tries cunningly to suggest to the soldier how he can most successfully simulate a disease. Just as the management of arms and the propaganda of modern war has been very much perfected, also the equipment of the malingerer has improved and, therefore, the physician must know these improved rules of the game of malingerers, the speaker explained. The hopes raised in the malingerer on the part of the enemy propaganda by the sentence: "The symptoms you find described in this leaflet are selected in a way that no physician can ever find out that you are really not suffering from this complaint, or that you have caused it by artificial means", are absolutely delusive. Aspirants of the medical corps examined the enemy advice in their theses of their own accord and proved that the instructions of the enemy propaganda for the production of paralyses of the extremities, simulation of epilepsy, etc. were altogether too difficult and required too much talent for acting. In the 33 hospitals of the area of the speaker, though special heed was given to the subject, not a single case of production of one of the diseases recommended in the leaflets has been observed. The few simulations of any disease the speaker had seen within a year (self-poisoning by thallium, hemmorrhage of the intestines produced by artificial means by introducing a knitting needle into the rectum) were done by methods which are not contained in the sporting instructions. The speaker also made a survey of the simulations of infectious diseases of the different organic systems. Most frequent are the simulated diseases of the stomach about which he was several times consulted as expert by military courts. Most of them (the simulators) were members of the "Volksliste 3". (Volksliste 3 was a roster of individuals who did not desire do adopt German citizenship.)

Discussion on the reports concerning self-mutilation and malingering.

BUHTZ: Of the cases of self-mutilation on which an opinion was given by myself, about half proved to be suspected wrongly (accident caused by arms or of some other kind, caused by the enemy, disease). In the field most cases concern gunshot wounds in all the limbs and parts of the body, chiefly on the left side, while in the home area cauterization and injections, e.g. of petroleum are more frequent. Intentional breaking up of artificial teeth and spectacles was likewise observed. The method of examination is described; a report is given on a new method worked out in collaboration with WOLKEWITZ and very useful in the field for proving gunshot wounds by tracer ammunition (imbedding of glycerine-gelatin with formation of barium sulfate crystals. He further discusses the method of proving or ascertaining whether injuries were caused by explosive shells or hand grenades. Measures for the prevention of self-mutilations are discussed.

The number of self-mutilations is steadily decreasing and is strikingly small as compared with those in the World War I (1914/1918). This fact is due chiefly to the national political training of the masses.

HANDKE: In Breslau many cases of petroleum injections were examined. Determination by an analytic method is similar to that given above (combination of hydrolysis, fractional distillation of steam, fluorescence and solubility of organic dyestuffs). As for the persistence or the traceability of petroleum and similar substances it has been ascertained by experiments that after four weeks proof is hardly possible. According to the literature on the subject, hydrocarbons do not penetrate the skin. This proves true for vaseline as well as for petroleum. Experiments have corrobcrated this.

LUXENBURGER: The swallowing of black powder is said not to bring about fever but a general feeling sick and ill, combined with paleness, perspiration and singultus. Thus the pretended disease is to be made more credible.

JUNGMICHEL: The well-known "Sporting Directions" are now dropped from airplanes over France in the form of cigarette paper packings called "Gizeh".

However, I do not consider these directions to be very dangerous. They are too "subtle" for the simple man. The intelligent soldier who intends to commit self-mutilation chooses other means, because he realizes, that the German medical officer knows these Sporting Directions so that he is bound to be found out pretty soon.

As for the rest, I would say that on the western front a centralized examination place for self-mutilations has hitherto been unnecessary, because such cases were and are still very few and far between, owing to the special circumstances. The proportion of suicides among our troops on the western front is smaller than that among the male population in peacetime in Germany.

13. Psychiatrist expert opinion on self-mutilation and on neglect of duty when on guard.

Oberstabsarzt (Major, MC.) W. von BAEYER

These statements about self-mutilation are based on 32 personal observations by the author, 16 of which were cases in which his expert opinion had been asked while 16 concerned examinations of culprits in a surgical ward which were picket at random. Some of the culprits (12) had shortly before come to the front from the home area or from the hospital. The majority are young, even very young, soldiers. (22 delinquents from 17 to 25 years old). Apart from an officer who had sustained a concussion of the brain, all the other culprits were below the rank of corporal, soldiers of the rank of corporal were lacking. Nine of the culprits were previously convicted by military or civil tribunals, most of them had been previously convicted and were judged unfavorable by their superiors.

Characteristically the culprits do not offer a uniform picture, the majority, however, are weak, timid, unstable, unsteady, and irresolute men. Some of them were decidedly irritable, unstable in their moods, or desired to be regarded as important fellows, some impressed one as quite infantile without being abnormal in any other way. Imbecility of a slight or medium degree was often found, above all among the cases I had to give expert opinion on (8 of 16). An attempted suicide, and that a non-energetic one, occurs only once in the records of the antecedents. Most of the self-mutilators are bad soldiers; as regards their civil and social conduct, however, they are harmless, weak, slack men.

Among the emotions, fear and anxiety about their life are predominant, though this was very rarely frankly confessed. Some of the culprits declare, they wanted only to have a rest for some days. Real states of exhaustion before the deed could not be proved in any case. In some cases credible statements were obtained on difficulties of getting into touch with comrades and disagreements with superiors and comrades, particularly, when the soldiers had come recently from the former Polish areas of the Reich which were only recently incorporated. These people often had difficulties in making themselves understood and are not infrequently made game of by their comrades. Altogether one gets the impression that such difficulties furnish the chief motives for the deed. It is, no doubt, good comradship which prevents the individual soldier from making such desparate attempts at evading his duty. An understanding psychological judgement of the motives of the deed is not always easy, it is, however, essential for the juridical decision.

Strongly marked abnormal reactions are less important than might be supposed. A twilight state or other exceptional state of psychopathic nature was not present in any case. Four cases came very near to it, depression on account of homesickness, reactive depression for other reasons, a particularly intense state of anxiety when under fire, and a protacted reaction which may be considered as abnormal conduct.

Among the cases on which I had to give expert opinion there were 2 psychoses: One man injured himself in the beginning of a helplessly paranoid schiziphrenosis, another one in a state of epileptic twilight between two fits. In the case of an officer who had a small splinter sticking in the left part of the fore-brain which had not been noticed before, the deed was to be considered as a reaction due to an organic injury. The consumption of alcohol is not decisive in any of these cases, as it is in other cases of military delinquencies.

Exoneration took place only in the two cases of psychosis and in the case of which the reaction was due to some organic injury, also according to § 51, section 2, combined with § 42b in the case of an asocial, imbecile soldier unfit for military service. Extenuating circumstances were often stressed as to whether a case is "less severe". The decisions, however, must be left to the court.

Among cases of negligence while on guard duty, only careless falling asleep while on guard duty is discussed in detail. Continous lack of sleep and the heavy strain of guard duty on the soldier in the main defensive line is to be taken into consideration, above all the lack of recuperation caused by the frequent interruption of sleep and the monotony of guard duty at night. There are, moreover, great individual differences in the desire for sleep, according to constitution and disposition. Causes of an increased desire for sleep are e.g.: bodily and mental infantilism, inability to sleep, men suffering from vegetative dystonia (SCHULTE), weakening by infection and disturbances of the circulation. Some people fall asleep abnormally easily in an unattractive environment, though they are not actually tired. Also with the perfectly healthy person there is a limit to the "ability to keep awake" which cannot be overstepped in spite of the best intentions and the greatest energy. If, in case of a soldier who sleeps on guard duty, - after considering all external and internal circumstances, to which also belongs examination by an internist - it may be assumed that the limit of the ability to keep awake was reached, the careless falling asleep is to be denied when no psychical or organic disturbances of the brain can be demonstrated. The ability to keep awake, however, under given conditions always depends on the personal attitude and intention.

The question as to the sound state of mind (full accountability) arises in case of sleepers on guard duty:

1. if the resistance to natural desire for sleeping, due to psychotic disturbances or imbecility is suspended or reduced,

2. if the sleep itself is not physiological but is really a disturbance of conciousness due to brain-disease. This is the case above all with narcolepsy. Soldiers suffering from narcolepsy do certainly often sleep on guard duty. They are, however, seldom brought to trial, since the morbidity of their fits of sleep, combined with the effective loss of tonus is usually recognized in time, and moreover the patients often are decent and conscientious men and are not believed capable of any negligence. They are, of course, not responsible for their falling asleep on guard duty.

Discussion:

CHRISTUKAT: It is not possible to give reliable figures as to the total extent of self-mutilation, since the criminal statistics of war in their present form do not give information on this subject. Nor is the age of the culprits to be recognized which would be important for criminal biology.

Even the relatively low figures given by Herrn von BAEYER will show that from the point of view of criminal psychology various latent phenomena may be suspected in cases of self-mutilation. Therefore, it seems to be advisable to get the expert opinion of a psychiatrist, if possible for a proper judgement.

KLIMKE: Emphasizes the need of getting the expert opinion of a psychiatrist, above all in order to eliminate cases of a morbid character.

14. Forensic and toxicologic questions of general and special character.

Professor TIMM

The forensic proof of poison is based on the medical findings in the body of a living person or in a corpse, as well as on chemical proof of poison.

In the course of the last decade the methods of research and the identification of poisons have been extraordinarily improved, owing to the development of microchemistry and microdetermination, so that a great and decisive importance is often ascribed to the results of chemical research. Compared with this the diagnosis and the proof of poisonings by medical findings is still difficult. The clinical-chemical laboratory methods are mostly adapted to the differential diagnosis of infections or organic diseases, the knowledge of the more subtle traces of poisons in the body is very incomplete. A connecting link is lacking between the medical and the chemical findings which would enable the physician to test completely and corroborate the results of the chemical investigations.

For the microscopic-histological test of poisonings and, for the localized proof of poisons in the section by microscopic examination, the darkfield illumination of sections without microscopical findings and the silver sulfide method have proved suitable, particularly for the proof of minute traces of heavy metals, and also for proving the presence of the so-called trace-elements. Iron is often changed with poisonings.

Moreover, these methods provide new and wide prospects on the course of functional histo-pathogenesis. As an example special findings in the island apparatus of the pancreas are mentioned, in which in the body zinc is regularly present, as an important trace element besides insulin, both of which are lacking in the diabetic gland.

Discussion:

BUHTZ: The careful and adequate preservation without fixatives in glass receptacles (not metal, particularly aluminum vessels) is mentioned. In most cases too small quantities (WASSERMANN bottles) kept in unsuitable preservatives are sent in. Besides the samples for a chemical toxical examination, parts of organs in formalin must always be sent in fixed for histological examination. Cases of poisoning are mostly not recognized by the medical practitioner. On the other hand poison is often wrongly suspected.

A report is given on investigations concerning uranium nitrate, (radioactivity - photographic plate).

HEUBNER: I have obtained excellent results with simultaneous clearfield and darkfield illumination for the localization of particles of metal.

GEMEINHARDT: Very weak methyl-violet solutions are not only dyed green to yellow by admixing sulfuric acid, but the plain-colored methyl-violet solution is removed.

VI.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON OTORHINOLARYNGOLOGY

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

Early and late surgical and orthopedic treatment of injuries to the jaw and face.
(See Section XV, Articles1 - 5)

Hemorrhages endangering life as a sequel to injuries to the jaw and face.
(See Section XV, Articles6 - 7)

Medical examination for fitness for assignment as listening sentry.
(See Section XIV, Article 5)

Ear protective device.
(See Section XIV, Article 8)

1. Determination of fitness for military service of registrants afflicted with diseases and deficiencies of the ear.

Stabsarzt (Captain, MC.) Prof. MITTERMAIER

In case of chronic otitis media it is considered important to distinguish between the two clinical forms of meso-tympanic inflammation of the mucous membrane and epitympanic bone-destroying otitis media.

Although the chronic otitis media with central perforation of the tympanum must in many instances be considered as a disease "with tendency to relapses", it may be said, however, that the mild form is harmless. Otitis media in the majority of cases will be classed as a class B disease (fit for active service). A class L deficiency (fit for limited duty) will be assumed only if the suppuration of the mucous membrane cannot be brought under control and causes considerable pain.

Chronic otitis media with peripheral perforation of the tympanum: Only cases involving the formation of polyps, extensive cholesteatoma etc. will be classed as an L deficiency. These require special and continual observation, especially because of the usual sequelae (labyrinthitis, meningitis, sinus thrombosis etc.). The epitympanic diseases which take a more or less regular course, without particular symptoms and which as a rule will only require occasional medical attendance every few months, will be classed as a B deficiency.

Radical operations should be carried out only if none of the specified complications are involved, and if an essential improvement, that is to say the changing from an L deficiency to a B deficiency is likely to result. The dry cavity of a radical mastoidectomy is considered as a B deficiency. Only in cases of continuous suppuration or abnormal sensitivity to weather conditions will a classification as an L deficiency be considered. In more severe cases with excessive irritability of the labyrinth, fitness for labor duties will be assumed.

Fitness for active service in a field unit depends on whether or not it is possible to avoid exposure to rough weather conditions.

A discrimination between the two forms of chronic otitis media is important in order to secure an appropriate treatment. Light and medium cases of inflammation of the mucous membrane with tendency to relapses can and should be treated by the army surgeon. It may justly be said that the efficiency in the service of these man depends largely on the experience and skill of the army surgeon.

Chronic otitis media with bone involvement must be given particular and continual treatment by a specialist, who has to give the necessary instructions as to date and kind of further treatment.

A brief entry in the paybook, pages 12/13, will be made when the outpatient or hospital treatment is over. The entry must be signed by the attending specialist, setting forth the specific form of chronic otitis media, such as otitis media chronica combined with inflammation of the mucous membrane, or otitis media chronica with bone caries, or otitis media chronica with cholesteatoma.

Practical experience shows that impaired hearing is often undervalued in the general medical examination. The inability to hear whispered speech at a distance of 1 to 2 meters must, however, be considered as a serious handicap in the performance of military duties, considering the requirements of modern warfare. The army surgeon should be notified in the medical report of the existing deficiencies, so that provision can be made for the exemption from patrol duties, sentry duty at night, assignment to sound detection units etc. The proper evaluation of these deficiencies often leads to a classification in the L category.

The fitness for active service depends also in these cases on a suitably selected assignment.

In case of a malignant aggravation or steady psychogenic defect of hearing it will not be considered sufficient if the examining surgeon personally has come to this conviction. Energetic treatment, best with the assistance of a neurologist (faradization) is necessary, until an improvement is admitted. In case of relapse the threat of disciplinary action or punishment for malingering should be considered.

Injuries to the ear due to detonations: Light cases will improve after a few hours, moderate cases after 2 - 3 days. Occasionally the improvement takes up to 10 - 14 days.

Defects of hearing due to injuries to the middle ear (rupture of the drum membrane, hemorrhages etc.) often decrease considerably in the course of time. The assumption is justified that lighter injuries to the inner ear may similarly recover fairly often. A prognosis is to be made only with the greatest caution. In more severe cases a limitation of hearing persists.

Injuries to the ear drum: Even if not followed by a suppuration of the ear the afflicted soldier should be given a fortnights leave from duty and have the ear treated regularly during that time. Many such perforations are likely to recover.

Besides impaired hearing, the attendant phenomena of injuries to the inner ear are to be taken into consideration, such as defective hearing, disturbing buzzing noises in the ears, in the beginning hypersensitivity to cold, to noise etc.

About two weeks after an organic injury to the inner ear has occurred it seems that no further change for the better may be expected. The medical opinion of the case is to be stated in detail, because it is to be expected that after some years a claim will be put in to the effect that these injuries by detonation are responsible for a physiological impairment of hearing which actually is due to old age.

An ear, once injured, is more susceptible to further injuries of the same kind that a sound ear.

As to disturbances of the equilibrium apparatus as a consequence of residual states after diseases of the vestibule, no important experiences could be made under field conditions. (A corresponding change of the list of deficiencies is provided in the new edition (note of the editor). This refers to the booklet distributed to physicians for a standard system of evaluation of disabilities. A copy has been translated by this section.)

Discussion:

KINDLER: Bilateral chronic accumulation of relapsing infection of the middle ear should be classified as U 32 (fit for labor).

In cases of rupture of the drum membrane caused by detonation, suppuration occurs mostly within the next fortnight, if it occurs at all. Therefore, these patients should stay for about a fortnight at the collecting station for casualties of the forces in the field under observation of an aurist, or for treatment in the special ward. If suppuration of the middle ear sets in they should be sent to the hospital, as should those showing simultaneous deficiencies of hearing.

THIELEMANN:

1. According to the experiences in the home army it is of no use to determine the degrees of fitness only by the values found for their ability to hear whispered speech. Experience has shown that a great many of the registrants pretend not to hear whispered speech etc. The classification by the aurist should therefore be as follows: slightly defective hearing, defective hearing, medium or high degree, without an exact statement as to the result obtained with regard to the ability to hear whispered speech.

2. Entry of the results of hearing obtained by the experienced aurist into the pay-book are to be recommended, since the results of the hearing-test obtained by the field surgeon examinations vary widely. Similar entries should be made concerning the character of any existing infection of the middle ear.

3. There are difficulties as to the classification of vestibular disturbances, slight vestibular disturbances, such as after injuries to the base of skull, must be considered according to the classification table as diseases of the inner ear and will be classified as such under U 32 (fit for labor). In case of disturbances of the equilibrium apparatus this classification is not available. The classification under L 19 does not always fit the case.

2. Determination of fitness for military service of registrants afflicted with diseases of the throat and nose.

Oberstabsarzt (Major, MC.) Prof. KINDLER

The classifications given in army manual 252/4 have proved highly satisfactory for the field of nose and throat diseases after about five years of war experience. By the orders concerning the degrees of fitness, issued in December 1943, they have undergone an effective simplification. The stable frame of the army manual 252/4 has proved necessary above all for the purposes of the army in training. A certain flexibility in the judgement has been found desirable for the field army. It is important, particularly in case of chronic illnesses, to take into consideration besides the symptoms and the objective finding of the disease also the previous employment and the present task of the patient. The general and medical-tactical situation too (static warfare, advance or moving defensive front with heavy fighting, possibility of transportation to a special hospital, length of absence from the unit during the stay in the hospital, and other things) are to be taken into consideration. It is advisable to keep the man with his unit by using palliative measures. Moreover it is proposed:

1. To treat chronic accessory nasal sinuses conservatively if possible and to classify them as L 34 (conditionally fit for active service).

2. To classify ozenas, apart from very severe cases, under L 34.

3. To introduce L 35,1 (conditionally fit for active service) for chronic tonsillitis, in order to further an early enucleation of the tonsils.

4. To classify partial traumatic paralysis of the vocal cords as L 18 or L 42 (conditionally fit for active service) provided that neither dyspnoea nor aphonia is present. In the case of aphonia, U 42 is suitable. If a plastic operation of the vocal cords gives some hope for improvement of the voice, U 42 would be the proper classification, at least for a certain time.

5. To hospitalize cases of a severe, non-specific, chronic laryngitis, combined with hoarseness, as U 42, in order to obtain a speedy improvement of the degree of fitness for active service.

Discussion:

RUDERT: Ozena, sure to become a nuisance to those closely associated, (confirmation by the specialist is required!) should be classified as unfit for service.

3. Judgement of general fitness and fitness for active service in the German Air Force in case of diseases of the ears, the throat and the nose.

Oberfeldarzt (Lt. Col., MC.) Prof. HUENERMANN

The soldiers of the German Air Force are divided in two large groups namely aviators and parachute troops on the one hand, and ground crews on the other hand. Special standards of fitness with regard to throat, nose, and ears are required only for members of the interception services, the selection of which was discussed in connection with the army physiology group. Otherwise the standards of fitness for the army apply also to the ground units of the Air Force.

The standards set for parachute troops are the same as those which qualify for unlimited service in the infantry, that is to say fitness for active service according to army manual 252/4 of the 1 April 1944. Moreover it has been ordered that hyperexitability of the equilibrium apparatus and stuttering as well as a removable dental prothesis or inability to chew common food without a set of artificial teeth must disqualify the soldier for parachute troops.

In the examination by the physician for prospective members of the Air Force the following facts must be considered: Nasal respiration must not be hindered seriously, chronic diseases of the nose, of the accessory nasal cavities, of the pharynx, and of the cavity of the mouth makes a man unfit for service in the Air Force, when they cause disturbances which render flying activity more difficult. Such disturbances are really very important, because they easily escape medical observation during the assignment period and, may interfere with flying operations, when there is too little recognition that not only the disturbances of the pressure equalization of the eustachian tube cause considerable pain, but that pain may also arise in no lesser degree from the accessory nasal cavities. These patients complain incessantly of headaches particularly during a high altitude flight. During the examination pathological symptoms are seldom detected unless a special X-Ray photogram is made of the accessory nasal sinusis, which often show a partial (one-sided) haziness in the photograph of the frontal cavities. In this connection reference is made to the observations of HERRMANN at Greifswald who has described hemorrhages into the frontal sinus cavity during dives in planes. In the classification chart this condition should be listed under Nr. 34 as L 34, particularly with regard to a chronic involvement of the accessory cavities.

As to the examination of the ears, the instructions for the medical examination for fitness as fighter pilot, aerial gunner, and as paratrooper or parachute gunner are as follows:

The eustachian tube must not be obstructed. Whispered speech must be heard at least at a distance of 2 meters. Considerable hypersensitivity of the vestibular apparatus renders the individual unfit. Contrary to the requirements of peace-time, these very strict conditions have stood the test in practice so that a modification is not taken into consideration from the point of view of the aurist. In my opinion great importance must be attached to the fact that the accessory nasal cavities which include also the middle ear, have a free communication with the nose or the naso-pharyngeal cavity, for otherwise considerable pains causing discomfort to the flying crew will occur during high altitude flights and dives and this hampers the execution of aerial operations. In addition this pain may also endanger the security of the pilot and thus the lifes of the passengers as well. A diagnosis is difficult, disturbances of ventilation are always to be taken into consideration, when the patient complains of local headaches and when either a distortion of the nasal septum or other evidence of a disturbance of ventilation are seen.

4. Judgement for general fitness and fitness for active service as regards diseases of the ears, the throat, and the nose.

Special requirements of the Navy.

Marineoberstabsarzt (Lt. Comdr., MC.) NOACK

On the part of specialists for diseases of the throat, the nose, and the ears, with regard to the 19 special careers of the Navy (Kriegsmarine) and to the special standard of fitness for the submarine service, the earlier standards of fitness must be retained which at the same time give an exact idea of the fitness of the soldiers for military service. Fitness for service on submarines depends on the directions published in 1943. For all careers requiring service on board a plane sound ears without any perforations of the tympanic membrane are required. Ability to hear whispered speech at a distance of 4 meters or 1 meter in one and 6 meters in the other ear. Navy radiomen, sound operators and sailors who operate the radio direction finder must have unimpaired hearing (on both sides ability to hear whispered speech at distance of 6 meters). Soldiers with mild, mucous mesotympanal suppurations are fit for general service in the field. All fetid suppurations of the bone are conditionally fit for military service. Classification in A 33 and B 33 are proposed, in which class A diseases mean only mild diseases of the nasal cavity without serious disturbance of the respiration, B - diseases, however, mean more marked narrowness of the nasal cavities and the nasopharyngeal area which can, however, still be corrected by surgical operations. The ability to smell is to be judged by the rhinologist not as A 18 but as A 33.

Chronic inflammation of the nose and the accessory sinuses make a registrant unfit for service at sea and on submarines; they are, however, still fit for service in the field and should be classified as conditionally fit for active service. Ozena is still retained as a class U disease because of living conditions aboard ship. Chronic tonsillitis must be cured by tonsillectomy before embarkation. B 42, "inveterate hoarseness", makes a man unfit for service on the telephone or microphone (BU), because of the difficulty of making himself understood and inaccurate transmission of orders.

Discussion:

UFFENORDE: In the Navy, which requires every man to be examined as to fitness for the submarine service, we take it for granted that about 10 per cent of the men are unfit for service from the viewpoint of the aurist. Of these only 5 per cent can be cured and made fit for active service by special operations: adenoidectomy, resections of the septum, tonsillectomy etc. Because of this additional tasks have come to our special departments, we have to guarantee a free ventilation of the eustachian tubes on both sides, for in the submarine service not only high pressure but also partial vacuum affect the ears in a higher degree than during World War I, and we have now to deal with irreversible disturbances of hearing. Thus I found in the case of an artificer warrant officer a one-sided hearing loss of a high degree which had developed in five months and which arose during an excessive partial vacuum. By a faulty execution of orders the Diesel air intake valve had been closed and the motor very quickly exhausted the engine-room, the patient felt a marked difficulty of hearing on both sides and for some days disturbances of the equilibrium when getting up in the morning. The hearing capacity was restored in one ear in a few days. In the other ear complete recovery seems very doubtful. This case is precisely analogous to the observation of a case of marked one-sided deafness lasting for 2½ years after the emptying of an underpressure chamber. In my case I must assume the effect of underpressure, while in the case described by SCHRADER the deafness was caused by a relative increase of pressure.

5. Experiences with the ear - battalion of Military District VIII.

Oberstabsarzt (Major, MC.) Prof. PERWITZSCHKY

Many of the patients suffering from ear diseases go from one physician and one hospital to the other and become therefore a burden not only to the regimental surgeons, to the evacuation units, and to the hospitals, but also to the unit to which they are assigned.

According to my proposal the diagnosis of earache and its treatment have for some time been entered into the paybook of every soldier, e.g. chronic suppuration of the mucous membrane, hospital treatment not required, even with considerable secretion etc.

This instruction was not of much use because men suffering from chronic suppuration of the middle ear are overevaluated by the army surgeons because of their exaggerated description of their complaints; yet these patients could do the heaviest work without difficulty in their civil profession, even under unfavorable climatic and professional conditions without ever having consulted a physician.

Starting from these bases the surgeon of the Military District VIII proposed to create a battalion for patients suffering from ear diseases. The purpose of the creation of this unit is:

1. To rid units, physicians, evacuation units, and hospitals of the above mentioned patients and to place them in charge of one physician who is an army surgeon and who is thus enabled to observe the soldiers not only in the hospital and in the sick bay, but also while on duty.

2. To reduce the number of men reporting sick, which will naturally happen when they know that they are going to be attached to a special unit.

3. To raise the efficiency up to a certain standard and possibility of a suitable employment of every single soldier according to the kind and severity of his illness.

4. To place these men under the systematic command of energetic officers which is necessary with the patients who complain again and again of all sorts of imaginable aches and pains.

5. To provide thorough military training which could not be carried out before with a great number of these men.

6. To improve the possibility of an employment of the unit in its entirety, in order to free other units in the army administration district behind the lines or at home.

7. To send patients suffering from ear diseases, who are unfit for military service, back to the civil section where they may be of better use.

The Commanding General of Military District VIII agreed to the proposal of the district surgeon and ordered the experimental formation of a battalion for patients suffering from ear diseases.

It is now nine months since that unit was formed, so one may be permitted to form an opinion about this project.

Those assigned to this battalion were patients with ear diseases, continuously or constantly relapsing diseases of the ears with the following findings:

1. One-sided central perforation of any size, while the other ear is anatomically and functionally sound;

2. Central perforation on both sides with sufficient ability to hear;

3. One-sided total loss of hearing, while the other ear is in good condition;

4. One-sided defect at the posterior edge with slight secretion while the other ear is in good condition;

5. Large one-sided distinct defects of the recessus epitympanicus, while the other ear is in good condition;

6. Radical operation on the ear on one side which suppurates frequently with good hearing of the other ear;

7. Continuously draining ear, following a radical operation on one side (tube angle) which requires constant supervision;

8. All ear diseases that have become dry and that are now judged according to B 32, but that are sure to begin to discharge again as soon as the patient is on active duty.

Not fit are:

1. Soldiers who have additional group L diseases;

2. Suppurations of all categories with insufficient hearing (under B 31);

3. Indistinct suppurations of the recessus epitympanicus with small fistula and cholesteatoma;

4. Suppurations of all categories with demonstrable involvement of the labyrinth;

5. Operative gunshot wounds in the ear with complaints of postcommotional pains.

The soldiers brought together in the "ear battalion" were then divided into four groups:

Group 1: comprises those whose otorrhea is quiescent and who have useful hearing capacity. Monthly control examinations are sufficient. This group numbered 209 soldiers when it was formed. They were employed for guerilla warfare or similar duties.

Group 2: Corresponds generally to the findings or group 1, but requires treatments once or twice a week. Strength 218 men. These patients are fit for duty in the line of communications area (patrol duty, escort), since the hearing capacity has already decreased with most of them.

Group 3: To this group belong those with considerable loss of hearing and in addition an ear disease which requires treatment two or three times a week. Strength 195 men. They are employed as a construction group.

Group 4: This group consisted of those, who were discharged after a short period of observation, which probably would not have happened if they had remained in their former units. Strength 33.

All companies consisting of patients suffering from ear diseases have their depot battalion at home to which they can be sent back in a case of more severe illness, and from which the units consisting of patients suffering from ear diseases are replenised.

All the men belonging to an "Ear Battalion" are returned to the battalion during their retention in the army in order to avoid their former depot battalion, so that after being wounded, the round of all the different hospitals could begin again.

It is clear that with the formation of this battalion initial difficulties had to be overcome.

At first it was not easy to prepare the members of the Armed Forces which came from various formations and arms of the service for their various assigned duties but commanders who were selected for this purpose were successful in overcoming this difficulty. Of course the regimental surgeon must be a specialist who has not only a good military presence but who is an expert in the special field of ear diseases, for only a well trained and responsible medical officer who knows also how to judge the complaints of the soldiers is of use. The successful existence of the battalion depends entirely on the quality of the specialist.

It is very interesting to learn how ear diseases react even under the greatest hardships and under particularly unfavorable conditions. In a test of endurance from 27 - 29 January 1944, which was undertaken in unfavorable weather, the following picture was shown with a participation of 35 N.C.O.'s and 442 soldiers:

18 men fell ill with angina,
5 men fell ill with pharyngitis and laryngitis,
3 men fell ill with bronchitis,
3 men fell ill with grippe-like infection,
1 man fell ill with lumbago,
3 men fell ill with neuralgia,
2 men fell ill with muscular rheumatism,
1 man suffered a contusion,
4 men were after a wounding, hindered in walking,
21 men fell ill with diseases of the feet,
1 man had to be sent to a hospital on account of an acute cardiac weakness,
4 men fell ill with an acute relapse (without suppuration of the middle ear (otitis media)),
5 men complained of dizziness without severe disease,
2 men suffered tearing of ligaments.

With this I come to the conclusion of my report: According to the reports of the commanding officer and the medical officer of the unit the formation of this battalion for patients suffering from ear diseases, first proposed for Military District VIII and carried out practically by Generalarzt (General, MC.) Dr. WALTER has thoroughly proved very satisfactory.

Discussion:

VON EICKEN: As aurists for the battalions for patients with ear diseases younger specialists are being considered suitable, who as yet have limited experience in the oto-surgical area but who have proved to be skilful and energetic in the military service. Many of these have not been considered hitherto as specialists.

MITTERMAIER: With men who already belong to a field unit, the regimental surgeon should decide after consultation with the specialist, as to whether the patient suffering from ear disease can remain in his formation or must be sent to the battalion for patients suffering from ear diseases.

Directions concerning the judgement of the general fitness and fitness for military service with diseases of the ears, the throat, and the nose; experiences of the battalion for patients with ear diseases in the Military District VIII.

The determination of fitness hitherto stated in the table of diseases of the otorhynolaryngology have been proved satisfactory after a war experience for approximately five years. It has been shown, however, that the chronic diseases, particularly those of the accessory sinuses and of the ears, must not be judged so strictly as is admissible during peacetime. Thus the majority of the chronic diseases of the middle ear can be diagnosed as class B diseases. Impairment of hearing of a high degree, however, renders every case conditionally fit for military service as class L diseases. Since a certain proportion of the patients with ear diseases remains with the unit in the main fighting zone, these must be treated by the regimental surgeon. An instructional pamphlet dealing with the treatment of chronic diseases of the middle ear to be carried out by him must be prepared. Following the excellent experiences which have been made with the formation of a special unit of patients suffering from ear diseases in Military District VIII, these formations will be introduced in other military districts too. For certain special careers in the German Navy or Air Force special requirements are necessary.

6. Concerning different grades of disablement and the awarding of the wound medal to men wounded in the field of otorhynolaryngology.

SS-Obersturmbannfuehrer (Lt. Col., MC. of SS-Troops - Elite Guard) Prof. BARTH

Directions:

Details concerning the different grades of disability are not recorded here again. Instructions on this subject are being prepared. (Editor's note).

If influence by enemy action is to be assumed in a case of difficulty of hearing approximating deafness the wound medal in silver may be given. Consequently if influence by enemy action is to be assumed in a case if impairment of hearing of a lesser degree the wound medal in black seems appropriate.

In case of an injury to the vestibular apparatus, supposed to be due to enemy action, the wound medal in silver may be considered.

In case of wounds caused by a gunshot into the larynx, combined with a distinct disturbance of function (respiration, voice) the wound medal in silver is suitable, the wound medal in gold may be awarded when such an injury amounts to a complete loss of the larynx.

With all awards of wound medals in silver and gold the injury must present some permanent damage.

7. The treatment of frontal-basal gunshot wounds of the brain and their sequelae.

Oberstarzt (Colonel, MC.) Prof. TOENNIS

I. Frequency and classification.

Among 4141 gunshot wounds of the cranium 80 per cent of the wounds were of the vault of the cranium and 20 per cent of the base of the skull. The latter are divided into

fronto-basal (64.55 per cent)
temporo-basal (27.37 per cent)
occipito-basal (8.08 per cent).

According to the kind of injuries of the brain we distinguish between locally limited gunshot wounds or depressed skull fractures caused by gunshots (75.67 per cent), and those caused by the bullet penetrating deeply and destroying the brain, those due to either lodging in the wound area (22.54 per cent), or passing through it (1.79 per cent).

II. Causes of death.

1. "Seriousness of the injuries". Among the causes of death among wounded men with fronto-basal depressed skull fractures due to gunshots the serious injuries amount to a third, with the gunshots where the bullet lodges in the wound area to a half, and with the gunshots where the bullet passes through the wound area to four fifths.

As was shown by clinical observation, this is a case of insufficiency of the central vegetative regulation, that is to say, the consequence of a traumatic injury to the brain-stem. This observation is corroborated by the fact that 76.5 per cent of the fatal cases were unconscious for days after depressed gunshot fractures and 100 per cent of the fatal cases after gunshot wounds with the bullet lodged in the wound area.

2. Infection: Among infections, complications of the inner cavity of the skull with the frontal basal injuries, direct infection of the subdural and subarachnoid spaces as well as infection of the basal cisterna are most frequent. The indirect meningitis we find during the first week only with a primary opening of the ventricle, during the later weeks as a result of an abscess breaking through into the

ventricle area. The progressive encephalitis of the medulla which predominates among depressed gunshot fractures in the cranium, is comparatively rare in this case; nor are such complications hemorrhages and edema, causing an increase of cerebral pressure, frequent with fronto-basal gunshot injuries during the first week.

III. Treatment of the wound.

The aim of surgical treatment is to prevent infection of the cerebral wound, of the subdural space, and of the fluid spaces. The primary infection of a cerebral wound is overcome by an radical removal of all fragments of brain, blood, and foreign substances, secondary infection by a water-tight closing of the opening of the dura by use of orbital tissue or of a periosteal flap.

In order to avoid subdural empyema, the subdural hemorrhages are regularly removed during the treatment. In preventing meningeal infection, the removal of the fluid in good time has proved very successful in addition to the sulfonamide treatment. Among the primary operations of the ventricle the rate of fatal cases of meningitis was reduced to 10 per cent. Fatal cases with depressed fronto-basal gunshot fractures (32.14 per cent) were reduced to a third (10 per cent).

IV. Final results.

Of all the cases of fronto-basal gunshot wounds (226) observed from the first treatment until their discharge from the home hospital, 25.66 per cent died. Of those who survived (74.34 per cent), 17.7 per cent were discharged as unfit for military service. 56.64 per cent returned to the Armed Forces, 10.8 per cent fit for military service, 25.22 per cent fit for garrison duty at home, 21.24 per cent fit for labor only.

Out of 40 cases of fronto-basal depressed skull fractures due to gunshots only 24 cases (about 10 per cent) had to be discharged from the Armed Forces because of a traumatic injury to the brain. In only eight cases of bilateral injuries of the frontal brain did the sequelae lead to a discharge from the Armed Forces.

8. Fronto-basal gunshot wounds of the brain accompanied by injuries to the accessory sinuses and their later development.

Oberstarzt (Colonel, MC.) Prof. PEIPER

The speaker specifies three groups of fronto-basal gunshot wounds of the brain with injuries to the accessory sinuses, in which the operative method is fundamentally different:

1. the group of recently wounded cases,

2. the group of recently infected cases,

3. the group of older cases in which in consequence of and insufficient operation, secondary-operations in the area of the accessory sinuses and the brain were required, and in which the area of the accessory sinuses is in most cases infected while the scar of the brain is not infected.

First he discussed several surgical methods used with group 1, with which, if it is not a question of small operative openings of the accessory sinuses which can be closed immediately without any major operation according to the situation of the injury, the frontal wall must always be removed entirely, including the arcus, while of the rear wall only so much is removed that the cerebral wound is easily accessible. The speaker asked for a wide extranasal access to the nose in any case, even if the ethmoidal cells were not primarily injured, since otherwise infections occur regularly and the frontal sinus does not heal up. In the case of recent injuries, therefore, the anterior and posterior ethmoidal cells must be removed according to RIEDEL's operation. After the treatment of the cerebral wounds the dura must be closed, preferably by plastic operation with pieces taken from the galea or with pieces of amnionic membrane. For these purposes the excellent effect of a pendunculated piece of mucous membrane of the nose, is especially mentioned, which presents the natural protection at the base. The 48-hours limit should not be exceeded in case of recent injuries. Insufficient or total lack of communication with the nose nearly always causes infections. Infected gunshot wounds must be operated as early and as radically as possible. The surgical rules are almost the same, a cerebral wound, however, is drained around a genuine sponge. This sponge is accessible from the area of the bridge of the nose. In cases of infected gunshot wounds of the ethmoid bone which require access from the frontal sinus to the nose the frontal wall of the frontal sinus had best not be left, since gunshot infections heal up badly or not at all. In old cases an operation on the old scar should be avoided if possible, since otherwise the infected area of the accessory sinuses and the scar of the dura are opened with the first incision. Before dealing with a large pyramid of splinters in the brain the source of infection in the accessory sinuses must be removed. If the arachnoidal scar bursts open in the infected area of the frontal sinus during the operation, a plastic operation is to be preferred to open treatment. The ideal is an early operation which presupposes the operating surgeon's thorough familiarity with otologic methods.

9. Initial treatment of fronto-basal gunshot wounds of the brain accompanied by injuries of the accessory sinuses and their later development.

Oberstabsarzt (Major, MC.) Prof. SEIFERTH

This report is to be published in "Archiv fuer Hals-, Nasen-, Ohrenheilkunde" (Archives for Otorhinolaryngology).

The chief task of the initial treatment of gunshot wounds in the brain is to prevent infections. The prevention of infections is still more important in cases of basal gunshot wounds in the brain in the area of the cranium. In cases of basal gunshot wounds accompanied by injuries to the accessory sinuses, secondary infection of the brain and its membranes threatens from the wound in the soft parts and in the brain and from the nose by way of the opened up accessory sinuses. Besides this an injury to the accessory sinuses may cause intracranial complications independent of the brain wound.

Of all accessory sinuses the maxillary sinuses are affected the least often in case of basal gunshot wounds. In case of gunshot wounds in the maxillary sinuses, comminuted fractures and injuries to the brain may occur at the base of the skull by the effects of explosion.

On account of the danger of an infection penetrating into the inner cavity of the cranium, basal gunshot wounds with injuries to the accessory sinuses must be treated surgically as soon as possible and at any moment the wounds have been inflicted even if injury to the dura and the brain has not occurred, or is not to be assumed. The only contrary indication for an operation are states like shock and collapse with a threatening failure of the circulation.

The direction of incision by which the cerebral wound and the injury of the accessory sinus can be opened at the same time, is demonstrated by means of illustrations. In operation of the accessory sinuses, the usual methods must always be applied because they afford the best access to and the best survey of the exposed accessory sinuses, and frequently give the great advantage that the gunshot wound can be avoided and the operation need not take place in the infected area.

The exposure and treatment of an additional injury of the orbit is of the highest importance.

In an opening up of the ventricle the closing of the dura must take place as a matter of routine after the second day, if no meningitis appears. Besides, in other cases the closure can be made even as late as the seventh day. Indications for this kind of early treatment are given.

An operation wound above the eye-brow is closed within the first two days, after the closing of the dura. Access to the nose is absolutely required in all cases with a primary suture of the soft parts. In cases to be re-treated surgically the nose is not exposed.

In the case of gunshot wounds with the bullet lodging in the brain the prospects are considerably worse than with uncomplicated gunshot wounds of the accessory sinuses, because of the larger surface of the wound and the more extensive contusion of the brain. A case is mentioned where the splinter, the size of a rice-grain, sticking in the cerebrum was followed by a meningitis that was healed up by conservative means.

In the case of gunshot wounds with the projectile lodged in the brain, the place where the bullet entered is always to be treated first, since in many cases the projectile can be approached from the hole at the point of entrance. For the treatment of gunshot wounds with the missile lodged in the brain an enormous magnet is indispensible. Splinters remaining in the area of the hypophysis which have entered from the accessory sinuses or any other part of the facial portion of the skull, must be removed by way of the accessory sinuses.

When, after gunshots with the bullet passing through the brain, the missile lodges in the accessory sinuses, the treatment of gunshot wounds with the projectile remaining in the affected part must not be delayed, because intracranial complications would develop sooner or later transmitted from the accessory sinuses and from the untreated wound of the dura and the brain.

When a subdural hematoma is suspected (tautly stretched, dark-blue colored dura and symptoms of cerebral pressure) puncture is to be undertaken. The exposure of the uninjured dura is not advisable.

Among the complications in gunshot wounds at the base of the skull, meningitis is most frequently observed. Pathogenetically five forms may be distinguished, which, as regards prognosis, are to be judged differently: the infection of the meninges from the accessory sinuses with intact dura (spreading meningitis), meningitis due to infection of the external fluid spaces from the dura-cerebral wound (direct meningitis), meningitis as a result of an infection of the ventricle opened by the gunshot, meningitis due to an abscess breaking through into the ventricle and by late breaking through into the ventricle by progressive encephalitis. The decision, as to whether it is a case of aseptic or bacterial meningitis, is of fundamental importance. With patients suffering from gunshot injuries with incompletely operated accessory sinuses, cases of long lasting meningitis were observed which showed a severe clinical picture with a pronounced psychotic componet.

In meningitis the chief feature of the treatment is the surgical elimination of the primary focus. All meningitides were re-treated surgically according to otorhinologic principles. The additional therapeutic effect of sulfonamide preparations has been shown clearly in the case of pneumococcic meningitis.

In the development of an early abscess liquefaction of the cerebral tissue plays an important part. The tendency to encapsulation is the greater the later an early abscess develops. When treating this early abscess it is essential to limit and to encapsule that zone of tissue which is liable to liquefaction and to suppuration. This is achieved by the use of a genuine sponge according to the method of PFIPER.

Special attention is to be paid to the indirect basal injuries of the orbit and the ethmoid bone, which occur with communicating fractures in cases of serious gunshot wounds in the cranium and in the base and which frequently result in dangerous intracranial complications. The results of the treatment of cerebral wounds can still be improved, if these injuries are detected and submitted to treatment earlier than hitherto while the man is still in good condition.

Out of 137 soldiers wounded by gunshots 31 (22.6 per cent) died; 24 cases were closed injuries, without any opening of the dura, 4 (16.6 per cent) of these died; 113 cases were open cerebral injuries of which 27 (23.8 per cent) died.

10. Infected fronto-basal gunshot wounds in the brain affecting the nasal accessory sinuses, and their sequelae.

Stabsarzt (Captain, MC.) Prof. GREIFENSTEIN

In all cases of gunshot injuries to the upper sinuses an involvement of the dura and brain is to be assumed as probable until the contrary has been proved. This can be disproved only occasionally by clinical and radiographic examination, but usually only by surgical control. Every gunshot injury of the orbit is to a high degree suspect of being a direct or indirect additional injury to the upper acessory sinuses and to the brain. About 10 per cent of the cases of fronto-basal injuries were combined with the loss of both eyes, not less than 50 per cent with the loss of one eye. Only in very rare cases was contusion of some degree absent. In the case of gunshot wounds in the cranium, remote from the eyes, the development of an early or late "spectable-hematoma" is an important indication of an injury to the base of the skull.

In every case of a gunshot wound of the head with the missile lodged in or having passed through the cranium, remote from the accessory sinuses, the possibility of a direct or indirect injury to the accessory sinuses must be considered, particularly if the area of the upper facial part of the skull and the frontal cranium are involved.

Positive symptoms of an injury to the cerebral-dura are extravasation of cerebral pulp or discharge of fluid from the wound and the radiographic proof of a gunshot wound with the projectile lodged in the skull, or of a deep penetration of bone splinters into the vault of the skull. A reconstruction of the course of the missile in cases of gunshot wounds of the brain, and in case of gunshot wounds with the bullet remaining in the effected area, a reconstruction of the canal of the shot, permit relatively reliable conclusions as to the involvement of the brain whether the missile is present or not.

Special radiographs or the upper accessory sinuses, including an axial picture, stereoscopic picture, and laminated X-Ray picture can give important diagnostic and therapeutic indications. Usually there is a distinct disproportion between the insignificance of the radiographic findings and the seriousness of the picture of the injury obtained during the operation. Haziness of the sinuses may have various explanations: Traumatic-edematous swelling of the mucous membrane, hematoma, or empyema, or prolapse of the brain.

A high percentage of fronto-basal injuries caused by gunshots are brought up for medical treatment behind the lines unrecognized and therefore are insufficiently treated or not at all. They are to be considered as having already been infected after 48 hours. This fact does not exclude particular cases in which a primary closing of the dura can still be tried later in spite of latent infection. It may be successful.

Fronto-basal injuries caused by gunshots are to be treated surgically at any time. The risks incurred by the operation itself are, however, the greater, the later it is undertaken.

The appropriate treatment of infected accessory sinuses requires a thorough mastery of the rhinologic technique, and in the cases of fronto-basal injuries of the brain is just as important as the treatment of the cerebral wound which has to be undertaken according to cerebro-surgical principles. A careful and technically correct execution of the treatment of the accessory sinuses is of decisive importance for the prevention of an additional infection transmitted from the cerebral-dura wound during the healing process and of still greater importance for prevention of late complications.

On principle an infected cerebral dura wound must be treated surgically, under visual control, as carefully and directly as possible by the shortest route of access. As a basis for the direction of the incision, KILIAN's operation is to be considered which according to the peculiarities of the injury may be modified and widened by auxiliary incisions.

Enough of the injured bony cerebral wall must be removed to prevent overlooking an extradural hematoma or an abscess, and to expose an injury to the dura so that it is easy to inspect.

The treatment of an infected injury to the cerebral dura in the area of the frontal sinus without affection of the ethmoid bone must aim at an obliteration of the sinus according to RIEDEL's operation. The removal of residual mucous membrane hardly to be recognized macroscopically is really successful only with the aid of a small wire brush. By this a proper closing of the ductus naso-frontalis is obtained. Therefore, it is unnecessary to operate at the same time the uninjured, uninfected frontal bone and to form a communication to the nose.

If in the case of a large frontal sinus only a partial obliteration of the lateral sections is possible, a communication is formed between the remaining, surgically treated medical portion of the sinus and the nose in any case only after a thorough healing of the wound in the dura by a typical debridement of the ethmoid bone.

The ideal purpose of our proceedings in case of infected, isolated frontal sinus brain injury is to prevent an additional infection of the nose whether altogether or at least until the closed healing of the cerebral wound by limitation of the surgical area to the frontal sinus, and to prevent the healed up cerebral dura wound as much as possible from connection with an open accessory sinus system.

Injuries to the cerebral dura in the area of the ethmoid bone roof require a complete removal of all ethmoid bone cells, including the opening of the sphenoid bone sinus from an orbito-nasal incision, from which the after-treatment of the cerebral dura wound is also undertaken. Even if some groups of cells do not appear infected, macroscopically we avoid partial debridement, in order to create smooth wound conditions, easy to inspect in the neighborhood of the later developing scar. There is no cogent reason for including the uninjured and uninfected frontal sinus in the surgical area.

Injuries to the lamina cribrosa have surprisingly proved to be much less dangerous than we were inclined to estimate them in the beginning on the strength of prewar experience with the apparently much more virulent genuine inflammations.

Serious comminutions of the upper accessory sinuses, in most cases combined and bilateral injuries to the ethmoid bone-frontal sinus, affecting the lamina cribrosa and the orbits require an exposure of all affected spaces and of the injured dura, often by modifying the external direction of the incision and of the surgical procedure. Positive general rules cannot be laid down, as wide external openings rendering the injured area accessible and wounds in the soft parts frequently are already present.

In case of bilateral injuries to the upper accessory sinuses or comminution of the inter-frontal septum such as frequently occurs in unilateral injuries to the frontal sinuses too, a "Median Drainage of the Frontal Sinus" (O. MAYER) has proved to be advantageous.

Missiles are to be removed from gunshot wounds when the bullet is lodged in the upper accessory sinus system without regard to their size and their distance from the cerebral wall. This is accomplished by an external radical operation of the sinus in question. The idea of trivial injuries cannot be admitted in this case.

Injuries of the dura and the brain at the roof of the ethmoid bone offer, according to our experience, a better prognosis than those in the area of the posterior wall of the frontal sinus.

Depressed skull fractures caused by gunshot into the thin cerebral walls of the accessory sinuses present, in most cases, an open bone gap, i.e. with a decided tendency to prolapse.

The after-treatment of infected injuries to the cerebral dura should be undertaken individually; valuable measures in this case are a dilatation of the cavity by "gradual draining of the cerebral spinal fluid" and a radiographic picture of the cavity filled with air or radiopaque solution. In case of complicated, hidden or small abscesses a tamponade by means of a rubber sponge is hardly practical.

Also an apparently spontaneously healed up fronto-basal injury must be dealt with by a late operation, if an infection of the accessory sinuses is proved. Its performance is technically very difficult and is accompanied by greater risks than an operation at an earlier time.

Besides a late abscess and late meningitis the formation of mucopyozelene is a serious late complication after injuries to and operations on the accessory sinuses.

Only 12 per cent of all treated fronto-basal injuries had already been dealt with before they were sent to the special ward of the general hospital in the home territory.

Discussion concerning the reports on fronto-basal gunshot wounds in the brain:

MUENDNICH: In the discussion on the reports concerning an early operation of fronto-basal gunshot wounds MUENDNICH refers to his treatise published in "Zeitschrift fuer Hals- usw. Heilkunde", 49/1943 (Periodical for Otorhinolaryngology 49/1943) and stresses the following points of view:

As regards the location of the incision he remarks that the typical incision along the supra-orbital ridge which turns medially to the area of the lachrymal bone is preferable, while a commonly used incision which begins laterally just as the first incision, but ands above the root of the nose, is to be used only when it is not necessary to expose the ethmoid bone. A third location of the incision is mentioned, which is suitable for gunshot wounds above the supra-orbital ridge, and which has the advantage that the skin wound is situated at some distance from the seam of the dura and that the soft parts can be pressed more easily against the frontal brain by tamponade. He warns against auxiliary incisions above the center of the forehead if the nose is damaged externally, since by this the soft parts of the forehead become useless for later plastic operations on the nose. They should not be made down to the bone immediately, so as to enable one to prepare periostical-galea patches for a plastic operation of the dura.

He points out that if the dura is exposed, operations on the accessory sinuses which are not thoroughly carried out, may lead even years later to meningitis and wandering abscesses. Therefore incomplete debridement of the accessory sinuses is to be discarded.

If the frontal sinus is affected without opening up the ethmoid bone - from the frontal cranial fossa - the typical operations of the accessory sinuses should be avoided. The bottom of the frontal sinus is to be left as it is, the mucous membrane, of the bottom and of the medial wall is to be loosened with a rasp and removed.

In the area of the operation the mucous membrane is loosened and turned in towards the ethmoid bone or removed. A periosteal-galea flap may complete the closing of the infundibulum. The ethmoid bone, however, remains absolutely intact. By this means the dura seems to be protected in the long run against infections spreading from the sinuses.

(Satisfactory translation of the next paragraph could not be made because of blurred text. Editor's note.)

MITTERMAIER: In case of a primary closing of a wound caused by fronto-basal cerebral injuries a simultaneous routine treatment of the frontal sinus and ethmoid bone are rarely required. It is, however, not sufficient only to form a communication with the nasal cavity. Opening up the cellular system of the ethmoid bone means an infection of the cells which were not removed. A very careful after-treatment is required after every operation on the nose. - If surgical wound treatment is required, it is perhaps better to postpone the operation of the nasal accessory sinuses until a later time.

RUDERT: Of 1000 gunshot wounds of the brain operated on by myself at the eastern front 13 per cent were fronto-basal ones. For my report I have selected 600 sick-reports in order to eliminate as far as possible faults of judgement which might arise by differences in the external conditions. The wounded came mostly from swampy areas; the injuries were mostly caused by shell splinters, their first treatment had taken place in the cerebro-surgical department of a base hospital near the front and within 24 to 72 hours after they had occurred. The time of observation till the evacuation into a hospital behind the lines amounted to 4 weeks on an average.

Of the 600 gunshot wounds in the brain with which the report deals, 80 cases showed an involvement of the accessory sinuses. Among 63 fronto-basal gunshot wounds in the brain combined with tearing of the meninges which were operated, in only 19 cases could a closure of the dura be achieved by dura suture or by plastic operation. In 44 cases (70 per cent) a water-tight closing of the dura gap had to be given up because of

1. a distinct infection of the cerebral wound was evident, or

2. gunshot wounds with the bullet passing through were contaminated to such a high degree that a certain physical cleansing could not be achieved, or

3. by the anatomic conditions, e.g. in case of cerebral wounds in the area of the sphenoid bone and of the orbital infundibulum a closure of the dura gap was precarious or impossible.

In these cases after the surgical treatment of the accessory sinuses a tamponade was performed by means of moist DAKIN's gauze or iodine - iodoform gauze. It assists the drainage, preventing at the same time a cerebral prolapse. The tampon is removed on the 7th day and renewed every 2 - 3 days, until the wound cavity is filled with granluations. Lumbar punctures must be performed in order to equalize the pressure and to treat a possible meningitis according to the usual points of view.

Of the 19 cases with fronto-basal injuries to the brain which were treated by closing the dura, 13 (3 per cent) (sic) died, while among 44 cases of injuries to the brain treated with tamponade, 13 died (30 per cent). To enable one to furnish a comparative calculation of successes expressed as percentage, comparing the different techniques, the figures are indeed too small, apart from the various conditions under which the methods of treatment were applied. The difference between the two rates of success (30 per cent minus 16 per cent = 14 per cent) exceeds by only a little the medium rate of error which is computed at ± 10.9 per cent. The figures keep within the limits of the losses to be expected with gunshot wounds in the brain, as known by experience; they show that even with the often indispensable tamponade treatment fair results may be achieved. (Editor's note: This paragraph not entirely clear in the German text.)

WILDEGANS: Most of the patients who sustain injuries to the fore-brain do not lose consciousness at the moment. The smaller the area affected by the injury, the less is a concussion of skull and brain in their entirety, with the corresponding clinical picture of unconsciousness and irritation, to be expected. The larger the area affected, the more likely are these effects to occur. (Wounds caused by ricochet and grazing shots.) Commotio cerebri generally develops only if the direction of the effect of the trauma is towards the rear cranial fossa (Rhombencephalon and ependymal nuclei). Relatively frequent injuries are caused by contre-coup (occiput, cerebellum, orbital section of the frontal lobes, anterior part of the temporal lobes, windings of the brain in the area of the great falx and of the tentorium, between vertex and temporal brain). Only those injuries are to be considered as genuine contre-coup injuries when the cerebral sections situated between the area of impact of the projectile and the remote focus of contusion show no rough anatomic changes (propagated skull fracture, hydrodynamic forces, straining and tearing of leaving or entering nerves or vessels). More frequently there is a more or less broad track of contusion which traverses the brain in a fronto-occipital or a fronto-basal direction so that a continuous necrosis of the diameter of the brain appears which extends from the spot where the bullet entered to the cerebral surface on the other side. Deflections of the bullet occur particularly with gunshot wounds, with the missile remaining in the forebrain, when the impact of the bullet is in the area of the base of the skull (Sella turcica, Os petrosum), but also the spent missile which entered the brain from the forehead, hitting the vault of the cranium from within and rebounding from there at a corresponding angle into the brain. Thus nearly always we are dealing with depressed skull fractures due to gunshots.

It is only in exceptional cases that the particles of bone are thrown outward, as when the pressure of the explosion is directed to the outside, instead of being thrown violently into the brain and thus stick to the periosteum or are found scattered everywhere in the soft parts. The frontal brain has a marked disposition to swell to a degree which is otherwise found only with the vertex brain (areas of higher grade organization of the brain develop only late). Cerebral edema and encephalomalacia, therefore, often spread in the area of the frontal brain very quickly and widely. Nowhere else does one see such masses of pulpy, or liquid-pulpy brain substance of a yellow color with a russet tone drain off as in cases of such injuries to the frontal brain where, because of the cerebral pressure in the area of the frontal sinuses or of the orbital roof, a drainage towards the outside had to be made some time after a primary inadequate surgical treatment or after conservative treatment. Only exceptionally did these softenings take place soon after the trauma. As a rule there was an interval of 2 - 3 weeks between the injury and the increasing softening. The results of healing were astonishingly good with simple softenings. Corresponding to the disposition of the frontal brain to swell, an inflammatory cerebral edema with brain abscess may very quickly lead to considerable cerebral pressure which may occasionally become perilous even after the drainage of the abscess. Just as the forebrain swells quickly it often shows the disposition to decrease quickly, so that the majority of prolapses undergoes involution. The removal of a prolapse in the area of the forehead is to be considered only if a subsequent closing suture is possible, when an abscess in the prolapse has developed or if a better view of the interior of the brain can be obtained by a removal of the prolapse. Danger of an exposure of the anterior horns or chambers shifted in the direction of the opening of the bone occurs only rarely in the area of the frontal brain. Pneumocephalus developed frequently when the frontal sinus, the sphenoidal sinus, the tympanic cavity, the ethmoidal cells, or the mastoid process were opened up. Intracranial accumulations of air in the fluid spaces or in the brain itself in case of fronto-basal injuries are generally the consequences of an involvement of the frontal sinus. The air gets into the chambers either directly or indirectly by way of the basal cistern (cisterna chiasmatica and interpeduncularis), through the foramina Luschkae into the fourth ventricle and from there into the third ventricle and into the lateral chambers. Distinct, spontaneous ventriculograms were frequently observed. The phenomena of such intracerebral accumulations of air are unimportant as a rule. Later on a periodical discharge of cerebro-spinal fluid or pus indicates a fatal complication. Often the air was reabsorbed only after days and weeks following the closing of the dura gap and a corresponding treatment. An increase of pneumocephalus indicates a closing of the valve or a progressive decay of the brain. Fluid fistulae in the area of the forehead sometimes closed spontaneously. In consequency of the upright carriage of the head in supine posture the fluid discharges rather in its natural direction if it finds an open passage there. Danger of meningitis after exposure of the otherwise healthy frontal and sphenoidal sinus, as well as the ethmoid bone cells, is, with a fronto-basal gunshot wound which was operated on in time, greater than with other injuries of the brain. Surgical treatment assisted by sulfonamides brought about an important improvement

in this field. Healing of serious meningitis usually takes one to two weeks, sometimes rapid recoveries occur. Large doses of S (sulfonamide) are required (see WILDEGANS: Die posttraumatische infektioese Meningitis / On post-traumatic infectious meningitis, Chirurg 1943,14/).

Directions for the treatment of fronto-basal gunshot wounds affecting the accessory nasal sinuses and their sequelae.

In all cases of injuries to the face and head, particularly when accompanied by unconsciousness immediately after the injury a fronto-basal injury to the dura is to be reckoned with. During transport the danger of aspiration is to be prevented by a suitable position of the head (dependent and turned on the side). The aim of the surgical treatment is to prevent infection of the wound in the brain in the subdural area, and the fluid spaces. A primary infection of the wound in the brain is to be overcome by a radical removal of all particles of brain, blood and foreign bodies, a secondary infection by the water-tight closing of the dura opening. The following measures have been particularly helpful: Closure of orbital tissue, pedunculated or freely transplanted galea-periosteum flaps, free transplanations of fasciae from the upper part of the thigh and prepared amniotic membrane.

In case of fronto-basal injuries to the brain an appropriate treatment of infected accessory sinuses, which requires a thorough familiarity with rhinologic technique is just as important as the treatment of the wounds in the brain, which has to conform to the above mentioned principles. A careful and technically correct treatment of the accessory sinuses is of decisive importance for the prevention of additional infection of the wound in the cerebral dura during the healing process, and of even greater importance for averting late complications. If a primary treatment of the wound in the dura is no longer possible or no longer required, a surgical treatment of the accessory nasal sinuses must not be neglected. The infected wound in the brain is to be treated surgically according to general surgical principles. In case of threatening or actual meningitis a complete meningitis treatment (sulfonamide-treatment, previous aspiration of fluid) has to be undertaken.

VII.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON GENERAL HYGIENE AND TROPICAL HYGIENE

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

A.

The effect of Gesarol and Gix on flies, Anopheles and Phlebotomes mosquitoes.

1. The use of Gesarol and Gix.

Oberstarzt (Colonel, MC.) Prof. ROSE

The need for a discussion of the effect of the new agents for disinfestation is shown as follows:

The group of agents for disinfestation, which are derived from Pentachlor-diphenylethane, are agents, which, through their unusual method of action in the different phases of the defense against contagious disease, have produced revolutionary changes. These are agents, which poison the vermin by contact with their ventral surfaces and which are absorbed through their tarsal joints. They are elective nerve poisons with slow but certain effect. In consequence of their low rate of volatility and insolubility in water, they are characterized by an as yet undetermined permanent effect after only one application.

Therefore they bring us a prolonged protection for disinfestation, instead of the effect being temporary and of short duration as with all the previous measures taken against louse infestation. If skillfully used, they offer a protection against the spreading of lice among the troops. This method of disinfestation for civilians, which has previously been technically impossible, can now be executed on those groups of people, who are chronically infected with spotted fever and are backward in civilization. The extermination of spotted fever has been approached even in the backward areas by the systematic use of these agents. In spite of that the troops must be fully informed about "Lauseto" being used only against infestation with lice and that they are safely protected against an epidemic of spotted fever. Because of the slow effect, however, no complete protection is given against occasional infection by contact with spotted fever among the infected civilians. In order to avoid disappointment, we wish to point out, that single cases will remain until the method is applied among the civilians. In combating spotted fever, the agents mean an extraordinary saving of material and workmen in the establishments for disinfestation. They make an extensive decentralization possible as they may be used by the troops under the most difficult conditions.

As regards those diseases spread by mosquitoes and other blood-sucking insects, the new agents provide an economical possibility for a well planned treatment of the dwelling so as to eliminate the infections acquired in the house partly from human beings as well as from insects. We gain thereby an additional resourse of such great importance, that in my opinion it excells all our other preventive measures.

These new agents make the execution of the principles of complete disinfestation possible. The destruction of the agent of disease in the surroundings of the sick persons is now possible even in epidemics where previously the well planned execution of disinfestation seemed to be impracticable from the technical point of view.

2. Introductory speech concerning the development and character of the disinfestation agents Gesarol and Gix.

Stabsarzt (Captain, MC.) FINGER

Gesarol and Gix, as well as the agents used for impregnating cloth against lice, such as Lauseto, Multocid, Duolit, contain a so-called Gesarol complex as the effective substance which is in its synthesis covered by the patent of the German Reich dated 26 November 1943, for the benefit of GEIGY A.G. Switzerland. This agent is an organic combination, which is produced by the condensation of chloral with chlor-benzol and by which the replaceable hydrogen atom in the para-position is substituted for a chlorine atom, (Pentachlordiphenylethane). The greatest advantage of these agents for combating animal vectors is in their lasting effect, which has been sought for but has never been gained previously. In general their effect is that of a contact poison. The further protection of the troops by these agents depends on the distribution of the necessary raw material, which is very difficult to get as it is used for other important war purposes.

3. Report of laboratory experiments with Gesarol.

Regierungsrat (Government Counsellor) EMMEL

The experiments done in a laboratory with the Pentachlordiphenylethane preparation called "Gesarol" dealt with the method of the action of this chemical substance on Anopheles and compared with Aedes, Culex and Musca.

The results of the investigation concerning the manner in which Gesarol is effective indicated that for practical purposes the effect with Anopheles resulted from direct contact with the Gesarol coating. It is sufficient if the Anopheles merely touch the poison with their Tarsa (hair of arolium). Quite weak visible reactions with a long incubation time have been demonstrated to arise from a Gesarol-deposit for some distance at 22 to 33° C. (Gesapon 2 per cent and Gesarol spray-mixture 4 per cent).

Gesarol does not seem to give any kind of warning in the usual way. Anopheles mac. and Aedes aegyptil suck the blood through a Gesarol soaked gauze. Flies (Musca dom.) seem to notice Gesarol even less. Anopheles may, however, escape the further effect of Gesarol due to a fleeing reaction which is compulsorily put into action, if the motor excitement caused by the poisoning effect is active. We drew the conclusion from this, that for practical purposes, all areas in the room suitable for the Anopheles to settle down, must be treated.

If the effect of the poison is interrupted, a considerable percentage of Anopheles die. The ones which recover lose their legs and are no longer to be considered as vectors of malaria.

Six different stages of poisoning have been differentiated on Anopheles. With the help of them we are able to draw effect curves by testing the effect of different concentrations at different temperatures. Low Gesapon concentrations (o.5 and 1.0 per cent) with only a few active particles per surface unit, are effective even at 31 degrees, death occurring after about 23 - 25 minutes. Stronger concentrations (1.5 and 2.0 per cent) are less dependent on the temperature as regards the rapidity of the effect and the curves generally show a more constant course. On the average, death occurs after 30 minutes, while the first manifestation of poisoning is notable after 6 - 9 minutes

Besides the concentration, that means the density of the active substance per surface unit, the form in which the active substance has been distributed is decisive. Gesarol in the form of crystals is less rapidly effective and seems to be less readily absorbed. When the active substance is finely distributed, as occurs by the use of the emulgent Gesapon, it is absorbed much more rapidly and in addition it seems to be better absorbed. No quicker action can be obtained with a stronger suspension, but with a stronger emulsion which, in addition does not loose its potency even at temperature of 3° C. The death of Anopheles will be obtained with a 2 per cent emulsion after about 30 minutes and with a similarly concentrated suspension after about one hour and 40 minutes. In some cases Gesarol resistance has been observed in Anopheles. This suspension spray-mixture is not suitable for impregnating the nets for gnats in contrast to the emulsion of Gesapon, because it breaks off the web easily after drying.

Undoubtedly, Gesarol, which possesses a longer lasting effect has opened a new way in the field of combating Anopheles mosquitoes in the sense of malaria disinfection owing to its special use in the treatment of interiors by a deposit on the surface.

4. Experiments in laboratories and in the open air to test Gesarol and Gix on insects. Anopheles and Phlebotomes mosquitoes.

Sonderfuehrer (Special Consultant) MAYER

The examination of the effect of the preparation Gix on Diptera showed a high sensitivity for gnats, Anopheles, Aedes and Culex to its insecticide effect. The insects Musca, Stomoxys, Fannis and Drosophila have been found less sensitive. The cockroach Blatta was only slightly affected, while the cornbeetle Calandra was not affected at all. Besides Diptera families, such as Culcides, Muscides, Borbrides Sepsides Phorides, Stratiomyides, Sciarides and Psychodides (Phlebotomes) as well as Coleopteres, to a lesser degree Hymenopteres, Anachnides, Myriapodes Permaptera and Lepidoptera have been slightly affected. The agent thus has been found poisonous for a great number of insects, which are hygienically important.

The agents act as a contact poison and as a gas. Insects and gnats die after touching an impregnated surface for a period of only 15 seconds. The insects also die, if they only remain in a closed room and don't touch any impregnated area.

The agent used as a spraying agent shows an excellent effect when applied in a ratio of 1 cubic centimeter of 3 per cent solution per cubic meter. The rooms into which Gix has been sprayed, retain their toxic effect on insects for quite a long time. The more porous the surface and the warmer the room temperature, the shorter the effective time will be. The duration of the toxic effect may be prolonged by adding slaked lime. Porous surfaces cause a dilution of the agent on the exposed surface. Therefore concentration of the emulsion is not so important for the effect as the actual amount of the agent per surface unit. A more pronounced evaporation of the agent is caused by the rising temperature, whereby the effective time is decreased. The testing of Gix emulsions showed this unlimited stability in our climate.

Besides these factors the nature of the solvent is also of considerable importance as has been proved by the testing of two batches, which acted very differently as to their physical behavior and to their biological effect.

The experiments carried out in the open air near Berlin and in the southern districts confirmed the results obtained in the laboratories. In warm countries the effect depending on the material conditions of the treated wall, has not been of the same duration, as in moderate climates.

Gesarol used as a spraying agent did not show such favorable effect as has been obtained by the use of "Schweinfurtergreen" for combating larva of Anopheles. When diluted with dust, even the mixture proportion of 1 : 50 has not been sufficient when testing it as a spraying agent. Hereby an emulsion with oil and en emulgent has

been used. Benzol was used as a solvent. Emulsions produced with Gix showed the same results. Both the agents increased the larvicide effect of the oil, so that in comparison with pure petrol a saving of 99 per cent has been obtained.

The results required, however, a confirmation by open air tests which will be carried out this year. The agent Gix may be used as a varnish and a spraying and impregnation mixture with good results for combating the troublesome insects. Hospitals occupied by fever patients have to be provided with screens as the agent cannot prevent the to and fro flight of insects. It may be specially indicated for the treatment of winter quarters, to protect against culicides in those districts infested by gnats.

The same effect is to be reckoned with when Gesarol is used. Comparative tests carried out on Gesarol and Gix show a slower effect of Gesarol.

5. Field tests of the effect of Gesarol and Gix on insects, Anopheles, Phlebotomes mosquitoes.

Stabsarzt (Captain, MC.) KRUEPE

By tests made with Gesarol and Gix based upon the experiments conducted in laboratories by EMMEL, the usefulness of this new contact poison for insects was tested in regard to its effect on adult fever gnats under natural conditions.

In malaria infested districts of Greece, tests with the available trial quantities were carried out in 75 billeting-rooms located in stone houses or wooden barracks, part of which were provided with wire screened windows, 104 open troop tents and 713 bednets. Only watery preparations were used, mostly in the concentrations indicated for use on surfaces, in a ratio of 0.8 to 8 grams per square meter, sometimes also in a ratio of 16 to 33 grams per square meter.

The watery preparations, mostly of 1 to 5 per cent and exceptionally also of 10, 15, and 20 per cent were generally prepared only a short time before their application, and were sprayed on all surfaces of the accommodations, which were accessible to the insects, using pressure spray pumps (Weinbergspritze), with a medium nozzle adjustment. 1 liter was always used for 6 square meters of surface whitewashed walls in brick- or clay houses of unpainted walls or tent walls are less suitable. For a room with a surface of 120 square meters, nearly a quarter of an hour is required for spraying the necessary 20 liters of solvent.

The bednets had been impregnated with these contact poinsons by dipping them into the freshly prepared solvents. After wringing them slightly they were dried in the open air. One liter of the solution has been used on the average. By applying a solution of 1 - 3 per cent, 10 - 30 grams were taken for one bednet or 2 - 6 square meters.

The odor of the agents - Gix smelling slightly stronger than Gesarol - lasted only a few days and was never felt to be disagreeable or uncomfortable. A slight irritation of the mucous membrane in the throat and of the conjunctiva was caused during the spraying of Gix. A slight cough and watering of the eyes followed for one day. After the water has been evaporated the occupants had no more trouble. It has never been observed that these agents have poisoned persons or damaged furniture, clothes etc.

The field experiments so far carried out, conformed more or less to the subtropical conditions of Greece. The elective contact poison properties of Gesarol and Gix affect fever gnats and flies under natural conditions, as has already been shown by laboratory test. The properties remained effective for a period of 3 or 4 weeks. This applies particularly to the treatment of rooms in stone or wooden houses, in which after a single treatment of the room the insecticide contact poison effect could be observed until the 25th day, and that independently of the concentration in the range of 0.8 to 8 grams per square meter. In tents, however, a remarkable relation of the lasting effect to the concentration could be observed. The surface concentration from 16 to 33 grams per square meter had a similar lasting effect of 18 to 20 days, while concentrations of 1.5 to 4.5 grams per square meter were effective for 2 to 4 to 6 days only. The reasons are probably the shaking down of the spray from the tent walls caused by the wind, especially of the powdered Gesarol which adheres poorly to the walls and further by the early ineffectiveness of the active substance, caused by the high temperature due to the sunshine on the tent walls.

In contrast to the laboratory tests, the latent period, that is the time between the first touch of the insect's leg with the poison covered surface and the appearance of the poisoning is relatively long as well as the total period including the different stages of poisoning suffered by the insects prior to their death, during the very hot summertime in Greece. Gesarol has an insecticide effect, which kills flies after about 2 - 4 hours, Phlebotomes after about 3 - 5 hours and Anopheles after about 8 - 10 hours. Some of the insects were found dead only after 24 hours. Generally the strength of the effect was gradually reduced after the second week. This was deduced from the prolonged duration of the different stages of poisoning. Generally the oily preparation has a more rapid effect than the powdered preparation of Gesarol, while Gix has a more insecticidal effect than the emulsified Gesarol. It seems as if the oily solution can be absorbed better by the Tarsi of the insects than the crystalline form of the active particles. The various latent periods for the contact poison observed with the different insects are probably due amongst other things to the different metabolic situations of the day and night insects.

The bednets for mosquitoes and rooms treated in this way, remained perfectly free from Phlebotomes for 3 - 4 weeks, an observation, which has been confirmed by Stabsarzt (Captain, MC.) Dr. MUELHENS in October 1943 on the Isle of Crete. Warning effects by Gix and Gesarol on insects and Anopheles have, however, not been observed with similar clearness.

Dr. MUELHENS has observed by his experiments that even a few minutes contact with the poison covered surface is sufficient to kill the Phlebotomes even though they had already left the poisoned surface. During experiments carried out in the fields, it could not be ascertained how long this deadly effective time of contact lasts on insects and Anopheles, after they leave the rooms treated with Gesarol. It is believed, however, that the insects, having the possibility of flying to and fro in the rooms and tents, not protected by wire screened windows, have been killed by the effect of the poison outside the rooms, even in districts with great plagues of gnats and insects, where the inhabitants had already reported the increase of these insects.

The kitchen rooms have not been treated. For the use of Gesarol and Gix by the troops in the South-east, the following practical conclusions can be made:

1. Protection against malaria for the troops.

By the use of the new insect contact poison there is a possibility of keeping the rooms permanently in such a condition as to kill the Anopheles right at the place of malaria infection. Particularly at night these Anopheles get in contact with human beings infected with malaria, who serve as their blood donors. The Anopheles should therefore be killed immediately at the place of contact. This is a good way to obtain an effective malaria disinfestation in malaria district especially in military hospitals, sickbays, billets for troops and in the native houses of the neighborhood where parasite vectors as well as malaria infected people might be living. For medium sized rooms of about 120 square meters, about 1.2 to 2.4 kilograms are required per year.

By this method of combating malaria, in contrast to combating larvae, it will be possible to have instant effect regardless of whether the campaign starts in May or in October because the insect is combated at the spot of the malaria infection.

2. Protection against pappataci-fever for the troops.

This is the only treatment of the bednets for mosquitoes which offers an extensive protection against bites of Phlebotomes and transmission of pappataci-fever. Treatments of the rooms, especially in military hospitals, are certainly even more effective.

3. Protection against insects in kitchen and working rooms.

During my experiments I have observed that combating flies in the kitchen seems to be more or less hopeless as Gesarol is sensitive to heat. For combating dysentery-bacilli the treatment of latrines may be successful to some extent. Gesarol and Gix are considered excellent agents for reducing the nuisance of flies in working rooms and offices, even though general use for this purpose is not authorized for reasons not difficult to understand.

6. Field tests with Gix and their effects on flies and Anopheles.

Sonderfuehrer (Special Consultant) KRATZ

Full particulars are given about the results which have been obtained in combating insects and culex with the preparation Gix.

The agent has been used in three ways:

1. In watery solution or in connection with chalk for treating walls. 3 per cent concentration, 200 cubic centimeter to 1 square meter.

2. For impregnating tents and materials.

3. The agent being used as spray mixture. 3 - 5 per cent concentration 2 cubic centimeters per 1 cubic meter.

The preparation has been sprayed ober the walls and furniture in different concentrations with a compressed air spray. The concentration for the different ways of application had to be varied. The range of the concentration was between 3 and 10 per cent. The following rule serves as a guide:

The hotter and dryer the climate, the higher the concentration required. 5 per cent of the insecticide effect remained on walls in barracks when treated with a concentration of 3 per cent. In order to obtain a lasting effect of 14 days in tents, a concentration of 10 per cent is needed. A brisk rain can wash the Gix solution out of the tent wals so that after some days the walls must be repainted.

This agent has proved to be an excellent means for killing insects and gnats. It is a definite aid for improving the hygienic conditions for the troops.

Discussion following the lectures concerning the use of Gesarol and Gix:

RODENWALDT: The justified enthusiasm concerning the effect of Gix and Gesarol should not tempt us to renounce our measures concerning wire screening of windows.

In the kitchens of Banjoli and in the operating theater of the central military hospitals in Naples, Gesarol has been used with good results, but in those rooms filled with sick people suffering from severe burns, the use of Gesarol has ended in failure. If many insects fly into such rooms from the outside, they have plenty of time to trouble sick people.

Until insects and gnats are so injured that they are harmless, they have adequate time to cause infection by flying to and from badly treated latrines or by flying into houses where infected people live.

Anopheles do not all remain in the houses; some kinds of Anopheles fly into the houses in order to suck the blood of persons at certain hours without even touching the surfaces treated with Gesarol or Gix. Therefore we must not change any of our measures concerning wire screening of windows.

The action of the pharynx pump of gnats does not necessarily depend on the effect of Gesarol. By holding a gnat by the leg and placing the pharynx in the edge of a drop of water or blood, the gnat will suck up liquid until it is completely full, even running the risk of bursting. The liquid entering by capillary attraction probably puts the pharynx pump forcibly into action. Mr. FUELLBORN and I have often made use of this proceeding in our experiments on filaria.

LENZ: Almost all information taken from the reports gained by experiments can be confirmed by our own observations, for instance: the different strong effects of the agent, important for practical purposes, varies according to the porosity of the surface covered with the agent. I wish to mention especially the warning effect of Gesarol on Phlebotomes, subjectively demonstrated in our laboratory experiments. This is an important fact, as through the impregnation of the wood the warning given the gnats discourages them from forcing their way through the nets so that the sleepers shall not be annoyed or infected by the insects. If the insect can slip through the net and die later on, the result is not complete.

WEYER: The defensive and distant effects of Gesarol and Gix which previously have been ascertained only on Phlebotomes, must be tested by experiments carried out in the open air under the same conditions on insects, especially on gnats and flies. Use of strong prophylactics on windows and doors must be considered. The further chemical development of the agents should especially concentrate on increasing the distant effects.

The use of Gesarol and Gix for dining-rooms, kitchens, and supply rooms is advisable for combating the insect plague, as food and other supplies are not affected even by direct contact with Gesarol and Gix. The dampness necessary for developing the effect is found in the kitchens.

LENZ: The question asked by WEYER concerning the analysis of the method of warning is justified. It is planned to use it in the coming season of Phlebotomes. There are two important possibilities: The effect of volatilized atoms or by direct contact. The latter will be mostly in question. This would mean that the poison is felt by the insect almost immediately after the contact causing a regular escape reaction.

RODENWALDT: It is a matter of common sense not to renounce the use of any available agent for such a comprehensive subject as malaria. Gix and Gesarol shall be welcomed as our new weapons. But we should not neglect all the other precautions, above all not the wire screened windows.

MARTINI: has referred to the necessity of combating adult insects in billet for many years. In many of his works the following instruction can be read: "Kill the gnats in the house".

For over a decade Netherlanders have combated gnats in houses with spray-apparatuses, but they have confined the destruction of gnats only to houses with gamete-vectors, as was explained at the tropical medicine congress in 1938.

It has to be remembered that not every Anopheles remains in the same house where it has sucked the blood of infected persons. Therefore it is not at all certain that the development of the sporocysts necessarily has to take place in this house. According to the biological nature of the species and the air currents, the insects often leave one house and fly into another or into a stable. But it is impossible to treat all buildings with Gix and Gesarol. One has to decide, according to the urgency and the prospects of the results.

ROSE: Because of the well-known fact that in some districts of the tropics only a few Anopheles remain in the house, it is no reason to object against the method of treating the interior which does destroy the kind of insects that remain indoors. We have mostly to deal with this kind of Anopheles in Europe. The fact that the gnats fly in, bite and fly away again without touching the walls of the rooms at all is a rare occurrence. Almost the same relations exist between emphasizing by means of warning, the necessity of destroying Anopheles and systematically engaging in the malaria disinfection by treating the interior, as exists between combating venereal disease by instructive lectures concerning the dangers of this illness and systematically investigating the sources of infection and their elimination. The destruction of Anopheles as gamete-vectors within the houses has not been practiced by the Netherlanders for the past decade but has been resumed since the introduction of this concept by PARK ROSS in 1937. The systematic poisoning of the interior by the new contact poison of the Gesarol and Gix-group, represents a decisive improvement in comparison with the screening of Pyrethrum-preparation used by PARK ROSS. The treatment of the interior has to be performed systematically in all those rooms: a) where gnats are infected as known by experience; b) where they transmit an infection. It is quite natural that the use of other precautions for combating malaria, such as mechanical protection, combating incubation and medical protection will not be superfluous. The treatment of the interior with Gix and Gesarol can be executed immediately after having arrived at a new place, if one is in possession of the agent and a brush. The agents become effective immediately. All other precautions require much more work and much more time. The fighting troops of the airforce live under such circumstances, that they can be protected against insects by the use of these agents, while the army in the front line doesn't derive any advantage from the new agents. I consider the described Gesarol-resistance of some insects to be one of individual immunity or sensitivity, such as we know from the use of other agents. I don't believe in an absolute

resistance. High concentration and a prolonged exposure would probably lead to a good result. The volatility of the agents proved by EMMEL seems to me a new discovery of radical importance. The question is not yet clear, if the self-mutilation of the insect is incited in the central or peripheral system. In contrast to the statement concerning the entire non-poisonous characteristics of the agent for human beings and domestic animals, the limitation has to be made, that in connection with milk, Gesarol has poisoned chickens. I cannot agree with the explanation made by RODENWALDT concerning the working of the pharynx pump. I agree with EMMEL considering it to be an irritation. It has not only been observed on gnats which have lost their legs, but also on kinds of insects which do not maim themselves. Besides, the irritation leads not only to the absorption of liquid, but also to the absorption of air. It concerns a phenomenon which stands by itself in contrast to the observation mentioned by RODENWALDT.

Directions for the use of Gesarol and Gix.

A. General description.

The preparations of the Gesarol-group, Gesarol and Gix, are agents for combating insects which transmit diseases in closed rooms (Anopheles - malaria, Phlebotomes - pappataci fever, and insects - dysentery and typhoid fever). These preparations are contact poisons which kill the insect by a slight contact with the poison and after a certain period of latency. These preparations do not prevent the insects from flying into the rooms. In order to treat the interior, the agent is applied over the walls, and furniture and is used for impregnating the bednets. The permanent effect of this agent lasts for several weeks. It persists longer in a cooler than in a warmer climate, which determines the frequency of use of the agent. There is no danger of poisoning human beings.

The preparations, being extremely difficult to obtain, are only allowed to be used in bedrooms, especially in military hospitals, sickbays, billets for the troops and air raid precaution shelters and similar rooms, where people are likely to be infected by insects. The bedrooms of civilians must also be treated if they are a source of infection for the troops.

B. Preparations.

1. Gix (I.G. Industry) oily
2. Gesarol (Schering A.G.)
   a. Gesapon oily
   b. Gesarol spray agent, powder

They are used as follows:
The oily Gix will be emulsified with water from 0.5 to 3 per cent according to the climate and the nature of the treated surface as to roughness and absorbing ability. Thence the consumption for 100 square meters is calculated:

a. By the use of 0.5 per cent emulsion with 75 cubic centimeters of the preparation.
b. By the use of 3 per cent emulsion with 45 cubic centimeters of the preparation.

The oily Gesapon is produced according to the same prescription as Gix (see 1), the concentration, however, is between 1.5 and 3 per cent. The Gesarol spray-mixture is used as a watery suspension in 3 - 6 per cent concentration.

C. Instruction for preparations.

The necessary amount of the preparation will be stirred with equal amounts of water, in order to prepare an emulsion respectively a suspension. The remaining amount of water will be added while continuously stirring. The capacity of adhering to the wall will be improved by stirring slaked lime into the water before adding it to the preparation (100 grams in 10 liter water). The preparation can be added to the whitewash used in order to whiten the walls in the above mentioned concentration. The solvent lasts for several weeks if kept cool, but too much heat is detrimental to it, especially direct exposure to the sun. It is advisable to prepare only as much solvent as is needed.

D. Instruction for the treatment of rooms.

The best way of applying the solvent to the walls is the use of a back-pack spray, also sprays such as are used for fruit-trees or vineyards with medium nozzle adjustment, as they are used in combating malaria. Screening apparatuses, for instance "Flit"-spray, are unsuitable because of their small nozzles. The solvent can also be applied with paint brushes, wisps of straw or other devices of these kinds. The treatment must be repeated as soon as the effect diminishes, generally after about 3 - 4 weeks. The walls of the tent have to be treated with a higher concentrated solvent (up to 20 per cent) until they are soaked through. The oily preparations of Gix and Gesarol are suitable for treating the tentwalls, but the use of powdery Gesarol-spray agent is not advisable.

By the use of these contact poisons for insects all the other precautions for combating flies, Anopheles and Phlebotomes (mechanical gnat protection, removal of incubation areas etc.), are never useless but still must be employed with great thoroughness.

E. Instruction for impregnating nets for gnats.

The treatment of the nets is necessary for combating Phlebotomes as they slip through the ordinary nets. This kind of treatment, however, is not to be used for combating Anopheles and flies. The nets for gnats must be dampened with water first and after being wrung out, they are dipped into a 1 per cent (Gix) - 2 per cent (Gesarol, Gesapon, oily) solution. After that the nets are wrung out lightly and must dry in the open air, but not in the sun. The consumption of the solution is about 100 cubic centimeters for one net by treating damp nets, while one liter is used for one net by treating dry nets. The powder Gesarol spray-mixture is less suitable for treating nets for gnats.

B.

Disinfestation.

7. Disinfestation with quiet, circulating, and forced draft of hot air, TCP-procedure (TRAUTMANN, CLAUBERG, PFLAUM), mobile unit for the production of hot air. *

Oberstabsarzt (Major, MC.) Prof. CLAUBERG

Reference is made to the necessity for the instructions concerning hot air disinfestation which differ from one another in the different military units, coordinating all the medical and technical instructions given to the Armed Forces. They should conform to the latest experiences regarding the actual conditions of destroying lice in all periods of life (60° C. in 5 minutes, 55° C. in 10 minutes) and under different degrees of temperature in certain hot air systems.

Deficiencies of the construction as well as the improper use of the disinfection-apparatus were then discussed, in order to eliminate undesirable results (see instructions for hot air disinfection). The disproportion between the possible and actual hot air effect of all previous disinfestation systems led to the development of the TCP-process (TRAUTMANN, CLAUBERG, PFLAUM). This refers essentially to the system of partitioning the rooms where the disinfestation takes place, so that the hot air which is blown in will be equally distributed and forced with a minimum resistance through small metal tubes, shaped like a serpent, in the heat chamber of a delousing establishment (see drawings). The result of these installations with little consumption of material and energy were the following:

A short heating time and an equal distribution of temperature such as has never been obtained previously by any installation. An absolute disinfestation effect is obtained within a short time and without any additional long security period. An increase in the number of people disinfested is possible to a larger extent than previously (improvement of the entire capacity to 24 times).

According to the latest findings of experiments, leather can be disinfested with hot air 60 - 80° C. without being damaged after having been previously dryed at a temperature of 40° C. Suitable instruments for the regulation of temperature are necessary. Special care has to be taken that the boots are adequately exposed at the disinfestation in order to obtain a good result.

* published in a revised form in the "Zeitschrift fuer Desinfektion und Schaedlingsbekaempfung".

Mobile hot air installations for delousing purposes require adequate sources of heat in order to meet the special requirement in winter time. A sufficiently high temperature must be available to heat the installations and to kill the insects. The use of low steam-pressure is most suitable for the purposes. This eliminates the danger of scorching and burning the clothes. Furthermore, arrangements should be made for quicker filling of the delousing chambers, in order to eliminate the possibility of a rapid cooling of the delousing chambers, especially when used in cold weather and in the open air.

The heater of the type used in the rapid drying of newly built houses and which permits the introduction of hot air into given rooms by a hot air compressor will suit the purpose, especially in a rapid changing delousing action.

In case of new installations standard machinery for the optional use of hot air or steam for disinfestation, germinating and decontamination purposes should be preferred.

8. Disinfestation with HCN, Ventox, TV-procedure including procedure in boxes, tents and transportable equipment.

Oberleutnant (1st Lieutenant) GRAFENBERGER

Besides the use of hot air for clothing, highly effective gases play an important part in the disinfestation which is fundamental in combating spotted fever. HCN, Ventox and "Jllo-Spezial" constitute suitable delousing agents. These agents must be used in a professional manner. A proper construction of the gas chambers is necessary. They have to be gas-proof to a large extent and must be provided with a heating device to heat the chambers, as thereby the time of exposure and airing will be considerably reduced. They should be provided with ventilators if possible.

HCN is the most effective agent by which, with 20 grams per cubic centimeter, the lice of all stages die within one hour. Preheating of the chamber up to 25° C. is absolutely necessary, especially if the clothes are damp. Today it is exclusively used in the form of Cyclone, the liquid HCN is absorbed by a carrier and packed in air proof cans.

The chambers of 10 cubic meters capacity with circulation equipment, produced in large numbers, turned out well. The air in the chamber which is kept circulating by means of a pump to assure a close contact to the clothes is heated in a device and blown over the Cyclone carrier so that a rapid distribution and penetration is obtained.

An automatic opening of the cans will avoid any escape of the gas so that work can be done without gas masks. The rooms are ventilated with the doors closed by operating the same fan and the intake of fresh air will be preheated.

The chamber is free of gas within 10 - 15 minutes and the entire work of disinfestation lasts about 70 - 75 minutes. The clothes should hang loosely on racks which are very suitable regarding the utilization of space and are quick working. In large installations it is advisable to build more than one chamber.

The Airforce uses delousing tents of about 13 cubic meters capacity, working on the same principles; the warming of the chamber is obtained by a motor heater such as are used at the big air bases, or by special hot air stoves, provided with hand bellows. By the fact that gas is likely to escape from the tents the quantity required is twice as much as in solidly built chambers, that is 500 grams per tent. The ventilation is effected by a rapid movement of the side walls.

The German labor service used transportable gas chambers which were installed on trucks or trailers and work on the same principles. The use of HCN is so simple that quick and safe work is guaranteed if the equipment is properly handled. But to its high toxicity special care has to be taken according to the instructions for gas protection. Only specially trained personnel are qualified for such work. Working with makeshift equipment presents some difficulties.

Less precaution is required in working with a new agent "Ventox", a clear, inflammable liquid, which evaporates rapidly. It has an excellent effect on lice of all stages, but is 30 times less poisonous on warm blooded insects than Cyclone. Ventox is more effective on eggs than on the adult insects, this offers a greater security. The delayed fatal effect on insects caused by this agent, has to be taken into consideration in biological controls. The insects die probably only after hours following their being gassed. The agent is used in the same way as HCN. It only differs in that the liquid, which is contained in cans, is poured on the evaporator at the very moment of its use or sprayed throughout the rooms. 95 grams per cubic meter is the minimum concentration at which the mixture could possibly explode, therefore 50 grams per cubic meter is normally used.

Ventox may also be mixed with tritox, in order to increase the effectiveness. This mixture has similar good qualities and an excellent warning effect, but cannot be used by itself, for it shows insufficient effects on louse-eggs. Because of the instability of these two liquids, the mixture has to be produced shortly before being used as a gas (TV-procedure).

Jllo-Special is similar to the last mentioned agents. It is a mixture of carbon tetrachloride and allyl mustard oil. Because of its slighter effect as compared with Ventox, almost 8 times as much of it has to be used.

In spite of all the advantages of the gas procedure, a limit is set on its use by the insufficient supply of these agents and by the danger of poisoning; therefore a special training of the staff is required. The gas-procedure used in a well organized plan may help complete the possibilities offered by the hot air method.

9. Fundamental instructions for combating lice with impregnating agents.

Stabsarzt (Captain, MC.) FINGER

Two kinds of impregnating agents are being supplied for combating lice, in one Xanthogene compounds become effective on the respiratory organs, whereas the other, which consists of organic halogenous compounds of the pentachloridiphylethan type, has a poisoning effect mainly by contact. The development of the impregnation method with Xanthogene preparations is based upon the concept that it should be possible to produce - analogous to the chamber method - a toxic zone close to the human body inside the clothes by the use of highly effective gases, in which a distribution of the noxious vermin is obtained. The experiments carried out by REICHMUTH showed a possibility to impregnate textile fibres by precipitating the active substances by oxidation. This method was originated by FREIBERG and the development of the Delicia delousing preparation now being introduced on a large scale will afford the possibility of an economical use of raw material and a particularly effective use of the molecular rations of mixture, when comparing the quantity of the precipitated product with that of the basic product.

Owing to the particular method in which Xanthogen compounds are used their effect will be limited to a relatively short time. These chemical substances have to undergo a chemical decomposition, in order to develop their insecticidal property acting on the respiratory organs. The aromatic halogen compound, used as a contact poison, may remain on the fibre for quite a long time, without loosing its active properties, because their compounds are effective, just as they are without any previous chemical reactions.

The experiments carried out by REICHMUTH show that the effect of these particles depends on a special sensibility of the insect's legs and the distribution of the insecticide. The mentioned chemical substances are most effective on the finely built nervous organs of the insect's legs when they are used in the finest possible distribution. This fine distribution has been achieved by the described substances used as agents acting by impregnation (Lauseto of the I.G. Farben plant). The good results which have been obtained by the practical use of these substances is an important progress in combating animal vectors.

Recent experiments and practical experience gained in the field confirm that neither a lowered percentage of the ready emulsion nor a reduction of the active substance effects the efficiency even slightly. This means an important increase of the use of this method. "Lauseto"-impregnation is effective for about 15 months on stored clothes, while the protecting against lice on clothes which are being worn only lasts for about 3-4 months. If the clothes which were stored for 15 months are worn, they will still be safe for 3 months to follow. The clothes impregnated with "Lauseto" may be washed, but should not be boiled or pressed. Soldiers who wear impregnated clothes remain free from lice, even if they join comrades who are infected with lice.

It is the aim of our efforts to issue impregnated clothes to every soldier in the field. The underwear should, if possible, be impregnated right after being made, or at least before issuing them to the troops in the homeland. The impregnation of the underwear has also to be carried out by the troops themselves, as an exchange of the clothes during the short time of 3 - 4 months during which the impregnation is effective will hardly be possible.

The production of "Lauseto" and "Delicia"-delousing preparations is guaranteed in the future after overcoming all difficulties in obtaining raw material.

10. Impregnation agents (Lauseto, Delicia) powders.

Sonderfuehrer Wissenschaftlicher Rat (Special Consultant and Scientific Advisor) REICHMUTH

It is common knowledge now that the lice may not be checked and kept away from men by odors. The irritation-receptors of the louse are of different sensitivities (valence of senses). The louse is recognized as an animal longing for warmth. The efforts concerning lice protection have therefore been concentrated on the use of poison with a prophylactic effect.

For the first time prophylactic protection has been achieved with Xanthogene-compounds in which the active element is based upon the poisoning effect on the respiratory organs of the Bisethylxanthogene. Under the effect of these chemicals acting by impregnation on textile fibres the lice will die, owing to the destruction of the egg-laying and sucking organs. It is not necessary for the lice to contact the agent as the vapor passes through the fibre.

The necessity of contact with the chemical arises in the use of the preparation on the basis of chloride. A solution containing only 0.01 per cent of the active ingredient has been efficient enough to kill the lice within 24 - 48 hours, if only two claws of the insect were moistened.

Besides these experiments, tests were made to prove the effect of a fine dispersion of the insecticide and of the sensitivity of the noxious vermin's leg. In Diphenylenoxyd, for instance, it was observed that the substance which heretofore did not lend itself for practical use became useful as an insecticide when finely distributed on the textile fibre (when ironed).

According to these findings, more intensive effect was obtained by increasing the degree of distribution with the aromatic halogenated compounds of Pentachloridiphenylethane gas. These surprising statements, which are important for practical purposes were based on the discovery of highly sensitive cells on the feet of the louse.

It was confirmed that the special poisoning effect by contact of Pentachloridiphenylethane gas results from the method of impregnation, through which the best possible distribution of the active substance has been obtained, in consideration of the sensitive organs on the feet of the noxious vermin.

These results can be applied likewise to the powdered insecticides. It seems to be of great importance that finely distributed powders with poisoning effect by contact constitute a more rapid and economical method for vermin control when spread in boots and socks, and is advantageous over the method of treating leathergoods by a wet procedure. We know from experience that we cannot discard the use of the powdered agent in war time. These procedures will be used most extensively as soon as the necessary quantity of raw material can be produced, as is the case for the Russla powder now in use,

11. Consideration of the toxicology of insecticides of importance to the Armed Forces.

Oberstabsarzt (Major, MC.) Prof. WIRTH

When judging the question as to what extent people are exposed to danger when dealing with chemicals for combating vermin, the absolute poisoning effect e.g. the toxic or lethal dose for men or warm blooded animals is an essential, but not exclusively decisive factor. It is of great importance to recognize the warning effect of the agent, which is produced by irritation of the sensitive nerves of the ocular conjunctiva, the mucous membrane of the nose and throat and other organs. Finally physical and chemical factors play an important part, such as evaporation, solubility in water and fat, adsorption and the possibility of ventilation. The agents for disinfestation used for military purposes may be divided into groups, according to their chemical composition.

1. Cyanide compounds.

Hydrocyanic acid, one of the most effective agents for vermin control, which was used during the first World War, combines all disadvantages from a toxicological point of view. It is the most poisonous agent that has ever been introduced and it is, in addition to that, not easily detected by the senses. For this reason the use of pure hydrocyanic acid is not authorized for military use, especially not the so-called "tub-procedure". Only the well-known Cyclon preparation may be used for military purposes, in which a porous carrier is impregnated with hydrocyanic acid in connection with an easily detected warning substance.

The organic Cyanide derivates, Tritox, chemically called Trichloracetonitril, as well as Ventox and Acrynitril have been used as agents for vermin control since about 1939.

Most cyanide compounds are active, approximately in the ratio of the cyanide portion contained in the molecule. This does not apply, however, to Tritox and Ventox. They are considerably less active considering their cyanide contents. In these compounds the cyanide group is so firmly linked that even after weeks no hydrocyanic acid can be traced in aqueous solutions of Ventox. Both nitriles, when inhaled, have only the 40th part of the toxicity of hydrocyanic acid. It was proved by our own experiments that their effect on fermentation processes is even less; for instance, Ventox exercises only approximately the 100th part of the inhibitory effect of hydrocyanic acid when used in yeast fermentation and cell respiration; when used for the catalytic-reaction it has even as little as the 30 000th part of the inhibitory effect of hydrocyanic acid. The course of poisoning is also different from that of hydrocyanic acid. Apart from the irritation of the mucous membranes of eyes and nose caused by these cyanide compounds, acute poisoning symptoms such as excitement and subsequent paralysis, which are typical manifestations of poisoning by hydrocyanic acid, have been observed less frequently in case of exposure to cyanide compounds. Characteristic for exposures to the cyanide compounds are subacute cases of paralysis appearing at a time when the patient is no longer exposed to the poison. In this respect, Ventox is more similar to the reaction of Ethylenoxyd. Tritox is the moderately strong irritating substance of the two nitrils. Because of these properties and because of its ideal possibility for ventilation, Tritox can be considered as practically harmless. Ventox is perceptible by its odor even in innocuous concentration in otherwise odorless environments to experienced persons but it has far less of the specific irritation effect of Tritox. An "upper limit"* at which the smell becomes intolerable does not exist, even at 800 - 1000 milligrams per cubic meter for instance, and many people become accustomed to the odor.

Therefore Ventox, though having approximately the same absolute poisoning effect as Tritox, is considerably more dangerous in its use.

The method of simultaneous application of Tritox and Ventox, as developed by the medical section of the Armed Forces, is considerably less dangerous for men.

2. Ethylenoxyd.

The toxic effect of Ethylenoxyd when breathed by men and warm blooded animals is about the same as Ventox. It may be said that Ethylenoxyd is less toxic. After-effects are characteristic for Ethylenoxyd, which combined with motor paralysis and convulsions, may lead to death. According to investigations carried out by FLURY and WIRTH this may be due to the intracellular reaction of aldehyde.

* The "limit of intolerance" is defined as the concentration in milligrams per cubic meter, which, if active for one minute, compells people to leave the room.

Ethylenoxyd is hardly perceptible by the senses (smell, irritation). The possibility of ventilation is limited as with hydrocyanic acid. The hazard of Ethylenoxyd and T-gas is almost as great as that of Ventox.

3. Chlorinated hydrocarbons.

Carbon tetrachloride and trichlor ethylene are occasionally used as an additive or a substitute or even purely if nothing else is available. Both agents have about 1/10 of the toxicity of Ethylenoxyd. It is not always easy to detect them by their odor. The danger of chronic poisoning must be kept in mind always. Neurastenic symptoms (such as sleeplessness, loosing of appetite, headache, fatigue, gastro-intestinal disturbances) and furthermore anemia, liver troubles, disturbance of the central nerve systems even to delirium and raving madness have been observed. Cautious inspiration often causes a state of intoxication, euphoria and "Tri-mania". These agents which are not inflammable offer great advantages in their use, but the possibility of the formation of phosgene gas in centers with open fires must always be considered. Numerous cases of poisoning from the use of carbon tetrachloride in small medical bunkers have become known during this year. These agents should therefore not be used to a large extent for combating vermins.

Jllo-special: Jllo-special, which is not easily perceptible by itself will be easier recognized if allyl oil of mustard and carbon tetrachloride is added. Since the "limit of intolerance" for allyl oil of mustard lies at 50 milligrams per cubic meter, Jllo-special could be considered as a relatively harmless substance, if the chemical composition remains constant. Some alleged cases of poisoning, which have lately been caused by Jllo-special, are explainable only if the possibility of a different chemical formula is admitted.

4. Chlorpikrin ("Klop").

Trichloronitromethane is used for combating vermin in France and Russia. It is of great interest to study the captured material concerning this matter. "Klop" which was used as a war gas by the French during the first World War, forms methaemoglobin when used in high concentration for combating vermin, but causes toxic edema of the lungs when used in low concentration, similar to phosgen. The examinations carried out during the first World War show that the fatal concentration for cats is at 6000 and at 6000 - 12000 according to our own experiments. Chlorpicrin has a strong irritation effect on the eyes. Owing to its excellent warning effect, chlorpicrin is a convenient agent for combating vermin, from the toxicological point of view, in spite of its small possibility of ventilation.

5. Areginal.

Although no cases of poisoning have previously been known in the use of Areginal, the methylformiate, this agent has to be used cautiously because of its typical after-effects, which are partly caused by accumulation. Similar to all methyl compounds, the formation of toxic products has to be considered. An especially disagreeable after-effect is caused by the formaldehyde produced intracellularly (FLURY and WIRTH).

6. Sulphur dioxide.

In contrast to the above mentioned agents, which are effective by resorption, sulphur dioxide is locally effective, and causes irritation and inflammatory effects of the mucous membrane and of the eyes and throat. Sulphur dioxide is relatively harmless and may be detected by its smell, even in low concentration, similar to Tritox.

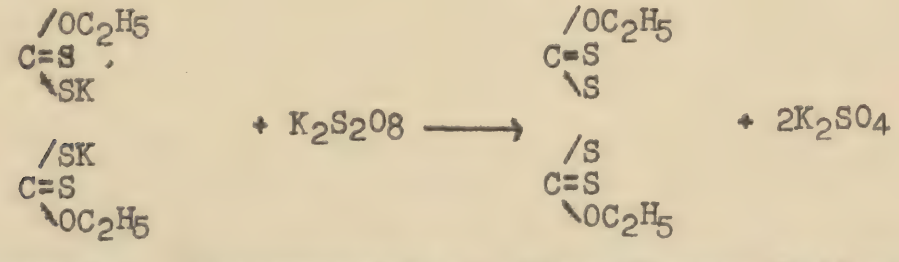
7. Xanthogen-preparations.

The firm C.F. BOFHRINGER, Mannheim-Waldhof owns an old German patent relating to a product called "Aulinogen". This is an ointment and on oily solution with Bixanthogen for combating lice and scabies. When mixed with sulphur it can be used for treating eczeme, acne and furunculosis.

During the Russian campaign 1941/42 a preparation was found with the Russians, which also contains Bixanthogen for combating lice, for instance in the so-called "Russian-K soap".

German firms have made use of the effect of Xanthogen compounds during the last year by producing further preparations, such as "Russla-powder" and an agent for impregnating washing, the "Delicia" lice preparation. While the effective agent Bixanthogen is already contained in the BOEHRINGER preparations, it is produced by oxygenation of potassium-xanthogenate in "Russla-powder" and in "Delicia" delousing preparation.

The necessary oxygenation is taken care of in "Russla-powder", whereas a special substance, such as potassium-persulfate must be added to "Delicia" for this purpose. In the latter case Bixanthogen is more or less absorbed by the fibre of cloth. This process is shown in the following structural formula:



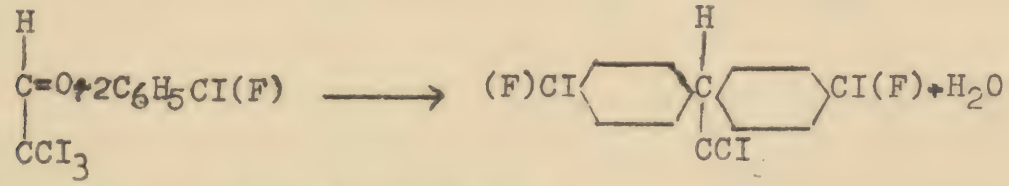
Xanthogen Kaliumpersulfat Bixanthogen Kaliumsulfat

The pure Boxanthogen is colorless and almost odorless. The white crystals become yellowish if exposed to the air and have an unpleasant pentrating smell, similar to mercaptane. In the attempt to distill Bixanthogen it seperates into its chemical substances, thereby forming toxic products such as carbon disulphide.

The toxicological examination of Bixanthogen, carried out with my colleagues Dr. POSTEL and Dr. SCHOLZ, showed no special results on mice except a numbness during the first exposure, when they were exposed to the vapors of the preparation for 20 days for 2 - 4 hours daily. The vapor of the substance is obviously too weak to cause any damage to the animals by inhaling the vapor which is developed by the preparation. The patch test with bixanthogen showed no irritation on the human skin, even when exposed for several days. If, however, the skin of a puppy-dog was dabbed with a solution of 10 per cent of Bixanthogen, in benzine every other day for about 3 weeks, the epidermis, as well as their hair will come off. This shows the keratolytic effect of the preparation, which is caused by its sulphur contents. No other general effects were found in the animals (the increase of weight has been perfectly normal and the urine has shown no findings). The substance causes, however, specific irritation of the conjunctiva of the eyes as well as of the mucous membrane. There is no objection to the use of Bixanthogen-preparations from the toxicological point of view, although we must admit that the very strong and unpleasant smell will often spoil the pleasure of using these preparations.

8. <u>Condensation products of chloral with halogen hydrocarbon (Gesarol-preparation)</u>.

The Swiss firm of GEIGY owns a German patent of 1943 relating to a group of substances for combating insects, which constitute condensation products of chloral with different aromatic compounds such as benzol and its derivatives with aliphatic compounds, such as urethane, formanid etc. The condensation products of this group of substances, including chlorbenzol or fluorbenzol are of special interest:



Chloral Chlor(Fluor)benzol

The compound which is derived from chlorbenzol is contained in the agent acting by impregnation for washing used for combating lice, called "Multocid", which has only recently been produced by the firm SCHERING as well as "Lauseto" produced by the I.G. Farben plant. The agent for combating insects called "Gix" contains the fluorine compound.

The substances which are insoluble in water, are, according to our own experiences without any notable effect on rats, when used subcutaneously in doses up to 2 grams per kilogram/body-weight in aqueous solution. Cats which are injected intramuscularly with a stronger dose of the

substance mixed with olive oil, show serious disturbances of the nerves, twitchings and muscular contractions. 1 gram of the fluorine compound used per 1 kilogram/bodyweight of the animal still has a deadly effect. The chlorine compound has at least the same poisonous effect. The substance showed neither any irritation of the skin of the animal nor of the skin of men, this has been demonstrated by our own experiences. These substances have no disturbing effect on the mucous membranes such as the conjunctiva of the eyes.

The Gesarol-preparations, which are already on the market, consist of a solution of the effective substances in an organic solvent and as far as their toxicology is concerned have to be considered from a different point of view according to the nature of these solvents. A greater percentage of chlorinated hydrocarbon, such as trichlorethylene, complicates its use. In this case impregnation has to be carried out in a well aired room, especially on hot days, in order to avoid any injuries of the attendants.

No case of poisoning has up to now become known in the use of Gesarol preparations apart from nausea caused by unsuitable solvents, such as Trichlorethylene for instance. At present examinations are being made to determine whether or not the above mentioned nerve effects of the effective substance are of toxicological importance in practical use.

Discussion of the lectures concerning disinfestation:

HUENE: It would be desirable to establish comparable data concerning the capacity of all delousing establishments. It is difficult for instance, to establish the number of persons who have to be disinfested within a certain time (8 hours) as the different units and branches of the Armed Forces need a different amount of clothing racks per person, owing to their different equipment (it varies between 1 - 6 clothing racks). The number of racks needed should always be considered when making any statements with regard to the capacity of delousing establishments.

In cases of delousing chambers with hot air ventilation a double ceiling with a distance of 20 - 25 centimeter between each ceiling has always proved very satisfactory. The hot air blown into the double ceiling will heat at first the wall opposite the blowing tube and then the adjacent wall of the delousing chamber, whereas the chamber will remain cold on the side where the air is blown in. In order to obtain regularly distributed heat it becomes necessary to insert special baffles (bricks placed vertically or horizontally) which deflect the stream of hot air. Deflecting sheet material baffles for a uniform spreading of the heat have proved very satisfactory.

The results of an examination concerning the spreading of the heat may be laid down in illustrative curves. The temperature can be ascertained by a maximum thermometer at a certain time and in different places, or with a pyrometer at different times and in different places of the chamber.

KREUSER: The experiences of the Eastern front (Middle East) have shown that the simplest methods have to be used. Therefore portable delousing boxes have been produced in bulk for each army (collapsible and transportable on small carts, capacity, 5 outfits). The method of impregnation has shown an extensive freedom from lice among the fighting troops. The troops are usually infected with lice and spotted fever by contacting civilians, therefore it is necessary to consider more generally the disinfestation of civilians. The disinfestation stations of the Armed Forces medical service, in collecting stations and hospitals represent another important barrier. During the establishment of these delousing stations the medical officer must instruct the technician according to his own experience in this field.

HARMSEN: In comparison with Russia the possibilities for physical disinfestation in the Balkans are reduced due to the enormous difficulties in getting raw material. The work of the plants is frequently interrupted by shortage of fuel. The guerilla warfare in the mountains makes the supply of portable disinfestation equipment almost impossible. The results obtained with "Delicia" were more impressive. Units, which had always been infected with lice, remained free from lice for several weeks. It is important to impregnate the washing and clothing of the prisoners of the guerilla warfare units as soon as possible, as they are, almost without exception, all infected with spotted fever and the disease would spread epidemically in and beyond the PW-camps, in spite of the disinfestation of the PW's.

PETER: The simplest methods for delousing purposes have also to be adopted for the Airforces in the theater of war. The development of the new and complicated installations is therefore unnecessary. Only medical units are able to supply "Lauseto" and other agents for disinfestation in time, as has been demonstrated by a long experience. The impregnation of underwear has to be supervised by the medical staff.

WEYER: Great importance has to be attached to the makeshift methods for disinfestation at the front, behind the lines, and in the home country. It is difficult to disinfest the body as well as leathergoods, furs, rubber etc., which is due to further shortage of the effective chemical agents for combating insects. Practical suggestions for such makeshift disinfestation are very welcome.

ROSE: In spite of the enormous progress obtained by "Lauseto"-impregnation the use of gas and heating methods should not be given up entirely. It should at least be used until the necessary supply is available without difficulties. We have also to consider the danger caused by the production failures. For this reason the use and production of "Delicia" should not be abandoned as it is still more efficient than the use of disinfestation with hot air. Although "Lauseto" is superior in its effect, "Delicia" might be used if the former is not available. I am also in favor of the request made by HUENE not to determine the capacity of delousing establishments according to the number of people or number of outfits. There is a risk of

spontaneous combustion in installations for disinfestation with hot air caused by dangerous contents of pockets, as well as by the oily clothes. We have to consider that oil has very often a much lower ignition temperature than the clothes themselves. This leads to spontaneous combustion in the chamber even if the construction of the chamber is perfectly designed.

REICHMUTH: It is emphasized that no definite decision should be made as to the use of these products. "Lauseto" and other preparations are good if sufficient quantities are available. As to the entire field of disinfestation a change of the products to be applied has to be expected; but we cannot yet dispense with the well-known preventive measures which have proved satisfactory.

FINGER: I am glad that during the discussion the question has been raised whether the physical disinfestation can be eliminated by the use of the chemical disinfestation applying the impregnation method. It is my opinion that this can be done. The main problem, however, is the question of the organization by which all units may be supplied with sifficient agents for impregnating all the underwear. This depends above all on the supply of raw material. It is necessary to further the development of contact-poison in the manufacture of the presently used chemicals as we depend on raw material which is available only with difficulties. Therefore we have to find ways and means to overcome the bottle-necks in case of unforeseen events. I should like you to come to a decision now, as to whether or not the use of the contact poison for impregnation will be exclusively adopted in the future.

Directions for the use of agents for disinfestation:

I. Physical disinfestation.

1. a. Simple instruments with static hot air (principle of a baker's oven) 90 degrees Celsius for 90 minutes.

   b. Instruments with agitated hot air without regulated flow EE-instruments (VONDRAN) 80 degrees Celsius for 60 minutes.

   c. In case of a possible introduction of TCP-instruments e.g. motor driven instruments with regulated flow of hot air should be used. 80 degrees Celsius for 15 minutes.

   One should be guided by the principles that only instruments easily handled will prove successful in the army. The instruments mentioned under a. are used for the army in the field, b. & c. for border areas (railway marshalling yards, ports of embarkation, airports) and for the home country.

2. The disinfestation has to be decentralized to the utmost in the army. The infestation has to be combated frequently in the troops, squadron etc.

3. If ovens are not available locally the troops have to use the delousing boxes of the army, which are collapsible and transportable on small horse carts. These boxes are specially recommended. A great number of drawings of these boxes will be distributed to all units, Airforce administrative areas etc., so they may produce this box themselves. In emergency cases, mass-production is advisable in consideration of the experiences made by some army units, airfores, etc.

4. Some units still use instruments for disinfestation with steam although the frequent use of steam damages the clothes more than a disinfestation with hot air at the above mentioned temperatures. The following times of application and temperature have to be observed: 96 - 100 degrees Celsius (steam flowing without pressure) for 45 minutes beginning when the steam starts to flow from the outlet valve located at the bottom of the chamber.

In such installations the steam will be introduced at the ceiling of the chamber; a sheet metal gutter will be fastened below the opening where the steam enters in order to catch the condensed water. The clothes must not be packed too tight and they must be hung on suitable racks.

5. Suitable racks have to be used for any kind of disinfestation with damp or dry hot air in order to avoid a too tight packing of the clothes. The drawings which show instruments for delousing purposes should also show drawings for clothes racks.

6. The temperature has to be regulated frequently during the disinfestation. If no thermometer is available, the so-called testpipes have to be fastened at a place where unfavorable heating conditions prevail. It is recommended to use Naphtalin, Anasthesin and Pyramidon as indicators for test material. The melting point of Naphtalin is 80 degrees, of Anasthesin is 90 degrees, and of Pyramidon is 108 degrees Celsius. In hot air devices the thermometer has to be fastened in the lower third of the box, in steam devices at the outlet opening.

7. In installations working with agitated hot air (11b) or with forced draft of hot air (11c) the directions for use have to be carefully adhered to.

8. It has been observed that combustible contents of pockets or oily clothes often catch fire. Therefore it is advisable to remove these combustible contents of the pookets and to delouse the oily clothes separately.

9. The capacity of the delousing chambers is 3 outfits per square meter of floor space. One outfit consists of:

1 jacket	1 hat
1 trousers	1 set of underwear
1 coat	1 blanket equal to 1 coat

As regards the capacity of installations with agitated hot air (11b) and installations with forced draft hot air (11c) please refer to the appropriate instructions.

10. Leathergoods and furs, as well as clothes made of rubber must be washed in a 5 per cent cresol solution and have to be dryed before disinfestation.

Chemical disinfestation (II) is the method of choice for all clothes of this sort.

II. Chemical disinfestation.

1. The chemical disinfestation has been proved satisfacto. for the use of agents acting by impregnation for washing. Especially the preparation "Lauseto" has shown good practical results for combating lice and as is kn from experience affords a simple and effective means which may be used in various ways.

2. If the use of impregnation is not possible, the clothes blankets and beds may be sprayed with the agents.

3. If the impregnation of the washing cannot be carried through, the former delousing methods have to be used (see sections I & II). The procedure mentioned under 3 is an emergency measure.

4. The greatest value of the agents acting by impregnation is their practical use by the troops. It is advisable to impregnate the stored washing and equipment of soldiers. Impregnated washing must be marked as such.

5. The 1 per cent emulsion of "Lauseto" has to be used as a rule for impregnations and for the emergency method of spraying.

6. The most suitable use of the agents acting by impregnation for washing ("Lauseto" and "Delicia") is guaranteed by the following schedule:

a. For the troops:

Used in the shower-room of the unit, to avoid excessive waste of material.

b. Used in the medical service (main dressing station, motorized medical rescue squads of the Airforce and in local field- and base-hospitals). For impregnation all underclothes, bedclothes of sick and wounded soldiers, as well as of the medical staff; further for impregnating cotton padding and bandages for large plaster of Paris casts.

c. Used in collecting stations for injuries, centers of evacuation, also for hospital trains, ships and aeroplanes. Used for impregnating or spraying all outfits straw-matrasses, blankets, as well as the clothes of sick and wounded soldiers.

d. Non-combatant personnel of the Armed Forces:

The distribution priority depends on the degree of the infestation and has to be decided locally.

7. Besides these procedures the agent for disinfestation can be used in the form of gas for gas chambers (hydrocyanic acid, Ventox, TV-procedure) Jllo, Areginal and others can be used according to the directions which were effective previously, except sulphur dioxide or formaldehyde vapor. For delousing chambers in tents "Jllo" must not be used. The inside walls of the delousing chambers have to be of such nature that the gas will not be absorbed (smooth walls, cement with suitable oil paint).

8. The previous experiences have proved that the supply and distribution of chemical agents for disinfestation should be taken care of through medical official channels. The use of these preparations should systematically be supervised by the medical services, as it has already been done.

12. The flea nuisance on the Ionic and Aegeen Islands.

Cause and Control.

Flottenarzt (Naval Surgeon) Prof. ZSCHUCKE

The flea nuisance in the area of Greece is limited to a sharply confined center and often becomes so intense that in some units one man is infected with an average of 100 fleas per day.

This is of little consequence from the medical point of view, apart from a skin disorder, which causes sleeplessness and sometimes a reaction of hypersensitiveness of the skin. In summer ulcers occurring on the leg below the knee are sometimes due to scratched flea-bites. It has to be considered that there is a slight possibility of transmitting plague from rats and kala-azar from infected dogs.

It is a remarkable peculiarity of the flea nuisance in Greece that the fleas are not only to be found in stone houses, wooden barracks or bunkers, which were already inhabited before being occupied by our army or enemies, but also the fleas attack tents and underground positions soon after their establishment - which have never been occupied before nor used for agriculture purposes - especially when the ground consists more or less of dry sand. The human flea is known to be a specific nest-parasite in the temperate zone, spending the entire time of development on the host. Despite this fact its resistance against lack of food (up to 18 months) and the absence of a specific monophagy (the desire for only one kind of food), - it can even live on the blood of cold blooded animals - allow it a great freedom of movement. The larva being sensitive to dryness as well as to

moisture probably does not find favorable conditions of life during its development, which lasts between 9 - 200 days in our climate in the open air.

The following theoretical possibilities for explaining the peculiarity of the flea nuisance in Greece are under discussion:

1. The nuisance is not caused by Pulex irritans, but by fleas, the main hosts of which are animals living in communication with men namely:

   Ctenocephalus canis and Ctenocephalus felis,
   Ceratophyllus fascinatus (europ. rat flea and plague vectors),
   Ceratophyllus gallinae, gallinulae, columbae, hirundinis,
   Xenopsylla cheopis (trop. and subtrop. rat flea and plague vector),
   Spylopsyllus cuniculli and Leptopsylla muscule (rare).

   We have investigated this problem, but due to the shortness of time we had to restrict our investigations to two districts, the Isle of Aghina and the north coast of the Peleponnese (Lutrakion). My colleague STAUDENMEYER found in both cases exclusively pulex irritans being parasitic on the skin of man and Ctenocephalus canis on dogs, although both were living in bunkers in close community. These statements don't allow extensive conclusions to be drawn from them for man may suffer sometimes more from dog-fleas than from human fleas and on the other hand the dog seems to be the most important secondary host for human fleas. The possibility of being affected by animal fleas has always to be considered and this problem has to be settled in each individual case for the interests of effective combat.

2. Pulex irritans does not require any protection of human dwellings in the subtropical climate of Greece, as they are able to pass their development in the open air, especially in dry sand. The propagation of the fleas by laying the eggs in the sand, has already been observed and for that reason the possibility of a develoment in the open air has been presumed, but this is contradicted by the consideration that the larva does not find adequate food in the sand for it lives above all on human detritus in the form of ephithelial scales and especially on remainings of the blood which are excreted, almost unchanged with waste matter by adult fleas. As the fleas also live on detritus of plants, such as dust of cotton wool and corn, this second possibility cannot be refused without any further investigations.

3. It is known that the human flea occasionally wanders about in large swarms; it may be possible that the desire for swarming is favored by the dry-hot climate of the Greek summer.

A definite explanation of the problem concerning the beginning of the flea nuisance in Greece cannot be given, owing to the insufficiency of the literature available to the investigator. The following directions for removing the flea-nuisance are suggested:

First of all the kind of flea living as a parasite on man has to be determined. When dealing with animal fleas the host has to be combated or disinfested. In the combat against rats and mice their cadavers have to be removed quickly, as the fleas turn from cool cadavers and attack secondary hosts. For military and ethical reasons it is prohibited to keep dogs in advanced positions. It is desirable and understandable to the owner of dogs that they are required to clean them regularly with a 5 per cent cresol-soap solution or with a dry treatment of insect powder. The flea brood has to be combated by scrubbing the rooms and furnitures with a thin cresol-soap solution, but even dampness alone should be effective, provided that sufficient liquid has been used and not dried up.

Both methods will prove effective only in the long run. An immediate effect on adult fleas can be obtained by disinfestation of the room with hydrocyanic acid, tritox, Illo or sulphur dioxide (not to be used in bunkers) also by a fumigation with Naphthalin (the latter being very scarce lately).

A certain effect can be obtained in rooms full of fleas by the use of the following emergency methods, such a spraying liquid with insecticide action, strewing insect powder or Naphthalin into the clothes, picking up fleas or catching them with the aid of individuals who attract fleas. At least it is recommended to air the room daily, to beat the clothes and bedclothes and expose them to sunshine and strew them with paradichlorbenzol (Globol).

Discussion:

EMMEL: In the dry desert district of the Cyrenacia it has been repeatedly observed that the development of the flea larva depends to a certain extent on the degree of the humidity of the surrounding medium. During the drought the flea attacks people in those tents where the floor is covered with mats, which are slightly sprinkled with water for cleaning purposes. The fleas caught are human fleas (pulex irritans).

MUEHLENS: Concerning the flea nuisance I wish to mention that I was attacked by fleas in pure sand far from any settlement. A large quantity of fleas could be seen on the beach of a small Island near Crete, where boats were landing regularly. In July with the ripening of the

grapes the fleas disappeared. The fumigation with tritox has shown good results in combating fleas especially when used in bunkers or caverns in Africa. A significant reduction of the fleas nuisance was obtained by washing out the prison camps with large quantities of water performed by the fire brigade.

WEYER: The fleas and the dog fleas have no share in the transmission of leishmaniasis (a disease due to infection with a species of leishmania). But there is still some confusion as to whether or not certain apathogenic flagellates are permanent or temporary parasites.

A considerable source for flea nuisance in billets are dogs and their kennels, which are not kept clean. This kind of flea nuisance consists of dog fleas. The medical officer should be able to decide whether this flea nuisance consists of human or animal fleas. Mass-breeding places for fleas are amongst other animal stables, such as horse and donkey stables.

ECKSTEIN: It is of great importance to find the original source of the fleas, as the indigenous non-military personnel often bring fleas from their homes into offices. This is given as an instance in Hierachin on the Isle of Crete and in Hamburg at St. Pauli. In both cases people were infected by human fleas.

In Hierachin on the Isle of Crete fleas were observed in great masses on the sand in the barracks-yard, which was defiled by the rubbish of the adjoining houses. Even in Lappland masses of pulex irritans were seen in billets built on sand.

STELLWAAG: As far as I have experienced the fleas jump on any man or even on any moving subject. The fleas do not prefer a certain kind of man, the effect of the bites is due to the man's sensitivity. Some people don't feel any reaction of the flea bites and therefore believe they have not been biten at all (similar conditions are known in lice and bugs). Every human being may serve as bait for fleas.

The firm of "DEGESCH" in Frankfurt am Main has tested Gix on fleas. After having sprayed the floor with Gix the fleas disappeared for about 3 weeks, after that one by one appeared again. A second treatment carried out after about 4 weeks has removed the fleas entirely.

KRUEPE: The flea nuisance was also removed in tents by spraying damp Gix and Gesarol.

ROSE: Valuable and rare substances such as Gix and Gesarol should not be employed for combating fleas. These agents have in the first place to be reserved for combating those vermins which as transmitters of epidemics endanger the troops' readiness for action. Keeping dogs with the troops for other than official purposes has to be prohibited for different reasons (madness, carrier of leptospira, reservoir of epidemics, leishmaniasis, transmitter of cysticercus and other diseases, carrier of vermin). The

order to avoid any unnecessary hazard and dogkeeping can only be allowed in the field according to service regulations. The medical service can only suggest it and has to set a good example for others within its own area.

Instructions for combating the flea nuisance on the Ionic and Aegean Islands.

In the Balkans the flea nuisance, which is limited locally, has to be considered by each case, if they consist exclusively of human fleas or parasites of dogs, rodents, cats or chickens. In the first case the precautionary measures have to be executed firstly against the proper hosts. The dogs and their kennels have to be cleaned regularly with a 2½ per cent cresol water solution and cadavers of rats and mice should be removed immediately so that their parasites cannot attack human beings. In combating human fleas it is most important to destroy the brood by daily scrubbing with disinfection agents and by using a large amount of liquid, such as a diluted cresol-soap solution, sea or salt water.

Adult fleas can be destroyed in the easiest way by the use of poison gas (hydrocyanic acid, tritox, Jllo or sulphur dioxid) carried out by well trained troops for vermin control, or by the method of spraying, which is an emergency means for disinfestation. Gix must temporarily be reserved for combating Anopheles and Phlebotomes. Daily airing and exposing the bedclothes to the sunshine is advisable. Reports on respective experiences will be forwarded by courier to the hygienist in care of Admiral of the Aegean, whose office identifies the transmitted fleas and examines samples of the room-sweepings picked up from the floor fissures. These samples, like fleas, keep well for practically unlimited periods if kept dry in test tubes.

13. Combating bugs in the field and in the homeland.

Sonderfuehrer (Special Consultant) Dr. ECKSTEIN

At first attention is drawn to the fact that the different disposition to react often leads to a false impression of the bug. Referring briefly to the cause leading to the present condition of combating bugs, the different methods of combating are briefly discussed in connection with the interesting details as to the life of the bugs.

The importance of wooden houses for the propagation of bugs is specially referred to and it is shown that overheating of the rooms makes the use of sulphuric acid even more difficult.

It is demonstrated that the close living together in the crowded cities leads to a higher danger of the spreading of bugs in these areas.

The constant moving of equipment is of particular importance as regards the spreading of bugs in the billets. The measures to combat the bugs should therefore also extent over the most important sources of infection.

As the beds built into the walls of the barracks make combating of bugs even more difficult and favor the propagation of bugs, the beds should never be built in.

All useless boards have to be removed and a greater tidiness in the barracks must prevail.

As we are not able to destroy bugs with good results every where and under all circumstances, methods have to be examined which are likely to give independence from gases which are difficult to procure and use.

It is important to arrange a well trained organization to combat bugs at home as well as in the field.

As the viewpoints of individuals with regard to bug combating is often wrong, particular attention has to be paid to a comprehensive and general enlightment of the Armed Forces. This is of particular importance at home, in order to have the ground well prepared for legal measures to be taken in the time to come.

Discussion:

REICHMUTH: The gap between gassing methods and strewn agents must be bridged over for combating bugs under the present circumstance. This was achieved by "Atota-compressor dust method", which has proved to work well as was shown by laboratory and practical results. This method is suitable for such rooms as are provided with electric connections or with bottles of nitrogen and it has already shown good results in large barracks and in all those rooms, which cannot be made tight.

The best prospects for success in combating with contact agents is now offered by "Room prophylaxis". The conditions for the application of "Room prophylaxis" are based on the sensitivity of the bugs legs, on the effect of the distribution of insecticidal agents and on the toxic effect previously observed in Gesarol, diphenylamine and other chemicals.

These experiments do not exclusively concern the development of insecticide, but their further object is, to study the effect of dispersion produced by various emulsions and suspensions upon substances with different porosity. Furthermore it will be examined how far the particular object of room prophylaxis can be realized, especially in combating bugs by adding a mixture of the different insecticides to chalk or oil paint.

All previous investigations carried out in laboratories seem to justify the hope that room prophylaxis can be executed by means of insecticide paint and therefore the practical application may be expected in the near future.

KRUEPE: Two rooms of a wooden barrack infested with bugs were treated by me with 2 grams of emulsifiable Gesarol. In one room stood fixed beds and in the other self-built wooden beds. After 5 days the soldiers were still suffering from bug bites. The observations were not continued after 5 days. It may be that after the time of my observation the bugs still came out of their hiding places, so that the immediate effect observed on fleas and gnats was not produced in the case of bugs.

MUEHLENS: I was able to destroy all bugs with Gesarol in a large sleeping room tiled with stone slabs and furnished with iron bedsteads. The bugs lived in the mosquito-nets and in the mattresses. The fumigation with Gesarol was performed with spraying guns and motor compressors.

In barracks and native huts shingled with wood, reed and clay, which were infested with bugs, I piled all the clothes and equipment of a squadron in one room and fumigated it with Cyclon B in an emergency. The huts were scrubbed and sprayed with a cresol solution, the walls whitewashed and by this method the huts were almost free from bugs.

ROSE: A discrepancy was observed in the reports concerning the first test with Gesarol, MUEHLENS has obtained good results, while KRUEPE did not observe any effect. Comparing these two statements it appears that MUEHLENS has fumigated the walls while KRUEPE only sprayed the walls. This is probably the reason for the different results.

ECKSTEIN: The failure of tests with products similar to Gesarol for bug combating is often only illusive, since the destruction of bugs needs a certain latent period and will become effective only under certain circumstances, sometimes only after 10 days. Such a delayed fatal effect will in most cases escape observation.

LAUN: The use of Gix for combating bugs is not to be recommended, as I know from my experiences. The barracks' walls being sprayed with Gix showed no success, even bugs sprinkled with Gix survived.

KLIEWE: Motor driven devices for disinfecting, disinfestation and detoxicating purposes have been demonstrated.

EMMEL: I know several cases where the kennel of dogs were covered with fern-leaves for combating the flea-nuisance when no other products were available. We had the impression that dogs did suffer less from fleas when the fern-leaves were renewed more often.

LENZ: The question concerning the biological combat of bugs by spider has lately been proposed again. On the strength of my information and of my own observations in Greece I am convinced that the spiders in practice are of no special importance for combating bugs. In the South East there are several kinds of spiders which attack and suck the bugs, but don't search for them in their hiding

places. Only if the bugs were chased systematically, would the spider play an important part in their destruction. Besides, sucking a bug takes quite a long time. It would be necessary to breed a certain amount of spiders in order to have good results. The possibilities of this method are thus very restricted.

TARTLER: Is there any proof that cockroaches exterminate bedbugs?

By coating the walls and furniture with a mixture of cattle gall and chalk good results have been obtained in my military district. A definite judgement cannot yet be given, but it would be worth while to gather all experiences.

ECKSTEIN: Cockroaches only eat bugs in case of need. Cockroaches and bugs don't exclude each other. That does not mean that they live in the same rooms. Bugs like to live in dry places, while cockroaches prefer damp places. It is possible to find bugs in one corner of the room and cockroaches in another.

14. Immunization against diphtheria and scarlet fever.

Introduction.

Oberstarzt (Colonel, MC.) Prof. ROSE

The immunization against scarlet fever and diphtheria has been recommended except for a few restrictions by the consultant hygienist on the occasion of the third conference. The directions for use are given in the Report of the third Conference of the Special Medical Consultants, Section VI, Article 4. The results of the recommendation given at that time have to be checked after on year. A desire was expressed especially from the clinics to be acquainted with the gathered results of the immunization. Furthermore we have to check whether the technical recommendations given one year ago have showed good results or if a modification is necessary. It is of great importance to answer the question whether the immunization affords any provable protection or not. The burden placed on the troops and on the medical service by every immunization is considerable. Immunization reactions cannot be avoided even if utmost care is used. The advantage of the immunization must be established beyond doubt or has at least to be made plausible to make us accept the responsibility of a compulsory immunization of the troops. The psychological indication to immunize only to be sure that nothing was neglected cannot be considered sufficient, considering the difficulties involved for troops and the medical service. The value of the immunization against diphtheria has been established in civilian medical practice by shifting the age level of the persons suffering from diphtheria. In the case of scarlet fever a similar advantage has not yet been proven. During the resettlement of the German population from foreign countries the immunization against scarlet fever appeared to be the principal advantage of a clearly recognizable reduction of scarlet fever mortality rate of two and a half times.

15. Present experience in prophylactic immunization against diphtheria and scarlet fever.

(Experiences of the Army).

Oberfeldarzt (Lt. Col., MC.) SEIFFERT

The after-effects of immunizations which often occur in prophylactic measures against diphtheria are divided into primary reactions caused by the injection and secondary effects caused by bacteria. The reactions of the first group usually corresponds to the reactions caused by other immunizations. However, they are different in the respect that they show a higher frequency of phlegmons and abscesses. The latter are considered to be specifically allergic and resemble the Arthus phenomenon. The incidence and rigour of the reaction increases with the age of the immunized people. By appropriate dosage the reaction may be reduced to a tolerable degree. The average reactions to the immunization are such that there are no objections against the immunization of adults.

The secondary reactions caused by bacteria are more serious and often appear cumulative and may lead to serious diseases and even to death. Instances are quoted. It is characteristic that haemolytic streptococci have always been found in these cases. Classifying these bacteria it was found that the same bacteria were consistently present in each abscess following an immunization. They are probably injected into the body with the serum. The contamination of the serum is usually due to the fact that the personnel who administer the immunization are suffering from angina or catarrh. In particular cases of injury due to vaccination the streptococcus may have been inherent in the immunized personnel. A localization of streptococcus is possible at a place where the immunization took place and is favored by the local damage of the tissue, which may produce toxoid and absorbans in allergic patients. The damage caused by prohpylactic immunization against diphtheria differs characteristically from the reaction caused by other immunizations.

In order to prevent those secondary reactions, the persons have to be immunized with the proper dose and with special precautionary measures as to sterility. All persons suffering from angina and catarrh or even persons who are in contact with people suffering from angina and catarrh and scarlet fever should be eliminated from those administering immunizations. Great care has to be taken to administer an exact dose and in the mixing of the serum in tuberculin syringes or with a correspondingly diluted serum. "Schick" testing is difficult to carry out when mass-immunizations are made. It is not yet definitely clear whether toxoid (anatoxin) causes more serious reaction on elderly persons than "adsorbat" serum when they are used in corresponding doses. On the contrary its application may be more convenient for adults.

No final results can be given as to the success of vaccination of the Army. But these diseases seem to reduce and to be less serious. Immunization in case of accumulated diphtheria which may be carried out without injuries (no negative phase) are not always successful. Diphtheria stops mostly by itself, when occurring in closed circles of persons and when carriers are eliminated. Even when carrying out the immunizations to a large extent a great number of diphtheria cases must still be expected under the present epidemic conditions. Immunized persons may become vectors and suffer from diphtheria which is difficult to recognize.

If a general immunization against diphtheria is carried out, one can only expect a partial effect of the immunization. A certain risk of immunization damage cannot be avoided. Through the army medical service a general immunization of the troops can be carried out. But before introducing it, the situation should still be cleared up more, as to which steps have to be taken in order to positively eliminate any immunization damage. If there is no general immunization, special groups of persons who are considerably endangered should be immunized by special order. The routine immunization of recruits under 18 years of age is recommended. It should be even more convenient to have these men inoculated by other non-military services before drafting them.

The limited experiences obtained by the prophylactic immunization against scarlet fever are on the whole identical to those obtained in the prophylactic immunization against diphtheria. It would be advisable to gather some more experiences on adults before introducing a routine immunization. Limited immunization should only be carried out by special order on groups of persons specially endangered. A general prohpylactic immunization of soldiers under 18 years of age should be taken into consideration.

16. Prophylactic immunization against diphtheria and scarlet fever in the German Labor Service.

Arbeitsarzt (Medical Officer of the German Labor Service) SCHWARZ

Since Autumn 1942 all registrants for labor service in the Reichs Labor Service were frequently immunized against diphtheria and scarlet fever when drafted. These two immunizations were made on different occasions and later on simultaneously. An inoculation against typhoid-paratyphoid was then intercalated between the two inoculations against diphtheria and scarlet fever.

An effect of the immunization against diphtheria on men could not be observed during their labor service. The effect of the inoculation against scarlet fever was more favorable.

The reason for the unsatisfactory result of the immunization against diphtheria is due to the present short period of labor service and the long period required for the inoculation to become effective. The reason for the better effect obtained with the inoculation against scarlet fever, carried out at the same time and under the same conditions, cannot be given as yet.

In case of the diphtheria epidemic in community billets it is not possible to dispense with the immediately protective inoculations, since they have a quicker effect than inoculation with adsorbatserum, which requires a long time to develop sufficient antitoxic immunity.

The intercalated typhoid-paratyphoid inoculations between the two inoculations against diphtheria and scarlet fever did not show any disadvantageous effect on the immunization against these diseases.

17. Experience with immunization against diphtheria and scarlet fever in the 1st submarine training division, Pillau.

Marineoberstabsarzt (Lt. Comdr., MC.) TOLK

Due to the fact that sailors of 17 - 25 years of age live very closely together on ships such as "Robert Ley" or work under similar conditions in diving tanks, there was a much greater possibility of transmitting diseases before immunization against diphtheria and scarlet fever was introduced. (242 cases of scarlet fever and 353 cases of diphtheria occurred within 3 years.)

In October 1941 1600 men were inoculated twice with 0.2 cubic centimeter within a period of 4 weeks. 94 cases occurred prior to the second injection while in the 3 weeks after the second injection only two persons suffered from this disease. The disease disappeared entirely. No complications due to the immunization have been observed. The examinations of immunized soldiers of the front flotillas showed no infection during the year following. In spite of that as a result of the bad experience noted by CLAUBERG this sort of immunization of men serving in the Navy was forbidden.

1500 sailors were immunized with scarletina toxin in October 1942. After the third injection no case of scarlet fever was observed while some of those sailors who had not been immunized became infected.

Encouraged by the good results and the excellent tolerance observed to the immunization, a combined immunization against diphtheria and scarlet fever was carried out in January 1943, at weekly intervals in the following order: Diphtheria 0.1, scarlatox I, scarlatox II, diphtheria 0.2, scarlatox III. These immunizations showed no complications. After the third injection against scarlet fever and after the seventh week following the first immunization against diphtheria, cases of both diseases were entirely suppressed.

In Summer 1943 a combined inoculation with diphtheria-scarlatox was carried out on two training divisions of the submarine service. In both cases scarlet fever was quickly and absolutely reduced. Of a total of 46 cases in 7 weeks after the infection of sailors of the first training division of the submarines, only 8 cases occurred between the 7th - 9th week. In spite of these incidents, the immunization must be considered a success. Among the sailors who were not immunized 15 cases of diphtheria occurred, showing the prevelance of the disease. In the second training division of the submarines there were 37 cases of infection with diphtheria, but after the seventh week this disease disappeared entirely. Therefore, in June 1943 the Surgeon General of the Medical Corps of the Navy gave the order to introduce immunization against diphtheria and scarlet fever for all sailors serving in the Navy and in the submarines. The results of the immunization of sailors attending the course of instruction could become apparent even in the next group. Owing to the difficulties in getting the necessary serum, only 57 per cent of men were immunized before entering the next course. During this course only one case of diphtheria and noneof scarlet fever occurred, while out of the 43 per cent of the sailors not immunized 41 were infected with diphtheria and one with scarlet fever. 62 per cent of the immunized sailors did not suffer from diphtheria or scarlet fever during the following course, while out of 38 per cent of the sailors not immunized 8 were infected with diphtheria and 2 with scarlet fever.

This proves that the immunization is very important for sailors serving on board submarines, as immunization has shown very good results on 13 000 sailors up to 25 years of age. Immunization should therefore be adopted generally by the Navy. The immunization carried out on 45 000 persons shows only very few complications when asepsis is observed, if the work is performed sterile, since only 11 persons suffered from abscesses of medium size. Furthermore it was observed that the course of the disease was a very mild one among sailors who had not received the full course.

18. Immunization against scarlet fever and diphtheria among young "Luftwaffenhelfer" * in 1943.

Oberstarzt (Colonel, MC.) Prof. ROSE

* A special group of the "Luftwaffe" (Airforce) consisting of personnel between 15 - 20 years of age who were not assigned to combat duty and were used principally to assist the older and higher trained personnel in maintenance of aircraft and anti-aircraft guns.

The practical purpose of the immunization of the younger ground force personnel of the Airforce was in the first place aimed at a control of the disease rather than of gaining scientific experiments. These would have required a card file system to register the result of inoculation and observation of each individual "Luftwaffenhelfer".

The data reported by the surgeons of the camps show that out of 10 000 inoculated helpers about 44 became infected with diphtheria and about 39 with scarlet fever. 80.7 per cent of the diphtheria cases occurred before and during the immunization and 19.3 per cent after the immunization, while 85.4 per cent of the scarlet fever cases occurred before and during the immunization and 14.6 per cent after the immunization.

As regards the observation period, it can only be said that on the whole it was much shorter before than after the immunization.

In contrast to the opinion of the chief of the divisional medical service, the opinion of the camp surgeons is altogether favorable regarding the results of the immunization. Four surgeons out of eight consider the immunization to be a specific success and that the cases of infection after the immunization are disproportionately milder than the cases occurring before the immunization.

Before judging finally whether this was a successful or unsuccessful measure, the sources of possible error have to be discussed and it should be examined which factors are decisive besides the inoculation, in order to explain the obvious differences between the cases before and after the inoculation.

Besides the insufficiency of the statistics concerning the period of observation, it should be pointed out that the figures given which appear to be precise and well founded are only the result of a simple addition of numerous individual reports, which came from different sources and show many mistakes common to medical mass-statistics, namely incomplete registration, incorrect reports, erroneous diagnosis, and the many errors due to the individual manner of compiling the reports, discrepancy in the evaluation of the cases etc.

The question whether the differences between the figures are only the expression of the fluctuation due to the season of the disease has to be answered in the negative. The result gained by the inoculation is so uniformly and equally good, from the epidemiological point of view, that it is suspected that the progress is influenced by some other fact. This contrast was confirmed by the result of my experiments made on Germans during the resettlement. I point out the fact that the service of the "Luftwaffenhelfer" is different from the service of our training regiments and technical schools. The main problem in latter is to combat scarlet fever and diphtheria which occurrs epidemically. The "Luftwaffenhelfer" soon after their first training are detailed into small groups. Only in the beginning of their service are they concentrated into larger groups but in the middle and toward the end of their service they are dispersed in small groups. This should have a favorable epidemiological effect. The decision whether this large influence is due to the immunization or to the conditions of a life under enemy action becomes practically impossible, because the unimmunized control groups were not available in contrast to scientific experiments. I should like to warn you against attributing the extremely favorable course of the epidemic before and after the immunization exclusively to the immunization.

Furthermore I also refer to the fact that the "Luftwaffenhelfer" were at the beginning of their service still exposed to the contact with other pupils in the schools and with their sisters and brothers, while the source of infection, produced by direct contact with other persons is much inferior, but not entirely eliminated, after they were drafted to the Airforce.

The following 5 injections with adsorbat-serum were administered:

On the first day the first injection against diphtheria,
on the 8th day the first injection against scarlet fever,
on the 22nd day the second injection against scarlet fever,
on the 28th day the second injection against diphtheria,
on the 36th day the third injection against scarlet fever.

The reasons for not inoculating individuals or postponing the inoculations are the following: diphtheria inoculation carried out in the school or in the Hitler-Youth before being drafted, having had diphtheria or scarlet fever during the two years previous to being drafted, local necessities, immunization against typhoid and paratyphoid being of more urgent necessity. Counter indications, such as skin disease (especially pyoderma) chronic otitis, encephalitis, epilepsy and other general diseases of all kinds.

In addition, the completion of the inoculation was deranged by transfers, assignments, furloughs and subsequent drafting or discharge, drafting for the Labor Service, for the Army or as a leader for the Hitler-Youth, etc.

The reported number of immunization must be considered more critically, since the evaluation of the incidents (infiltration, abscess, elevation of temperature; scarlet fever, exanthem, psychogenic collapse, etc.) the subjective factor is of primary importance. The same kind of incidents were observed which SEIFFERT has reported from the Army.

19. Excrements and smear-tests in diphtheria and scarlet fever.

Oberarbeitsarzt (Medical Officer of the German Labor Service) FREITAG

The committee was acquainted with the statistical data and it was considered justifiable to cancel the directions concerning partial isolation and bacteriological examination of the contaminated areas in case of diphtheria and scarlet fever in the German Labor Service camps. Investigations revealed that only 3 per cent of diphtheria and scarlet fever cases and 12 per cent of the cases with additional diseases might possibly be influenced by the partial isolation - in case of diphtheria - and by the examination of the contaminated areas. The first mentioned percentage is very low, on the other hand the benefit of the troops with regard to performance of active duty and to the general organization is considerable if all measures of isolation and of examination of contaminated areas of troops are eliminated. Under these circumstances even a higher incidence of infections would be the lesser evil (sic). According to our experience the infection with diphtheria and scarlet fever remained limited to a small group of persons.

The special importance of the clinical treatment of men in a unit suffering from diphtheria and scarlet fever is emphasized.

Discussion:

CLAUBERG: The fact that the injuries caused by immunizations are no longer trifling meets with general acceptance. The presence of hemolytic streptococcus in abscesses caused by immunizations against diphtheria are due to a break of asepsis. In view of the results caused by the inoculation against diphtheria which were contradictorily evaluated by the referees, the calculation of the theoretical probability is missing. The use of the extensive material in Berlin (Deutsches Aerzteblatt 1944, # 4) permitted the proof of the success with mathematical precision. Attention was drawn to the hesitancy concerning the simultaneous immunization in the Army, which was expressed at the last meeting. Although accurate tests regarding the necessary and appropriate antigen quotas for immunization against scarlet fever have not yet been carried through, the importance of these tests is stressed. If new cases of diphtheria occur, examination of the environment is considered unnecessary if the units have already been immunized. The question concerning paradoxical dissociation arises in the sense of an increasing incidence of the infection in non-immunized persons within the immunized troops and it is recommended that this matter be cleared up.

KROEGER: The following remarks seem to be relevant in connection with the arguments made by CLAUBERG.

In the evaluation of the diphtheria results in the Labor Service the application of the SCHELLING formula was not possible as the group of non-immunized persons was missing. As already mentioned by SCHWARZ all men were immunized unless they happened to be ill on enter-

ing the service. Therefore another method of evaluation has to be applied and the conditions of the civilian population must be compared with that of the troops. The conditions of the civilians showed good results concerning the general epidemiology of both infections.

The results in the Labor Service refer to about 900000 men who were immunized. These immunizations have been administered to adults, in contrast to the immunization of children mentioned by CLAUBERG.

The directions concerning the simultaneous immuniation against diphtheria epidemics were given in April 1943 to the troops with the "Directions concerning medical service". The danger of sensitization are usually overestimated. The Labor Service tried to prevent danger of sensitization by using serum from cattle and sheep as passive components of the inoculation.

ROSE: The statistics made on the "Luftwaffenhelfer" are not snfficiently reliable to justify a mathematical evaluation. The exactness of the evaluation cannot compensate for the shortcomings of the original material. Besides, the control group of unimmunized persons is not available within the "Luftwaffenhelfer" as this immunisation was carried out as a practical means of protection and not for scientific experiments.

PETER: The control of the theoretically probable rate of success of the protective immunizations gives a false impression of security which does not exist because the numbers of persons unimmunized or immunized are not exact. This is the case in almost all medical statistics during the war years, due to the extensive resettlements of the population.

WAGNER: In order to prevent injuries caused by streptococcus it has to be remembered that streptococci are widespread seasonal agents. Schoolchildren may easily be immunized at the appropriate time of the year, while the time for immunization for troops and Labor Service depends entirely on the conditions of war and on military requirements.

KRUEPE: Concerning the question whether injuries were caused by injection at the locus minoris resistentia, I should like to refer to the observations made by MUMME that pneumococci have been found in abscesses caused by infections after injection of solvochin as proposed for the treatment of pneumonia.

TOLK: Abscesses caused by immunization: Luer's glass syringes should not be used for inoculation, because the doctor as well as the medical personnel are able to touch the piston with the fingers so that it is no longer sterile after once being used (observation in our own units).

KREUSER: Investigations of the surroundings are still necessary for military hospitals in which the danger of combined infections has to be considered. For instance, the mortality rate of spotted fever raises up to 15 - 20 per cent in case of mixed infection with diphtheria.

It should be avoided that persons suffering from scarlet fever and diphtheria are together in one ward, as it is very likely that persons who have just recovered from diphtheria may be infected with scarlet fever, even if they seemed to be immune before.

Instructions for immunizations against diphtheria and scarlet fever.

To the instructions for immunization against diphtheria and scarlet fever given at the third meeting "East" the following supplements were proposed:

1. A general immunization against diphtheria and scarlet fever will not be recommended.

2. The leading medical officer has to decide in each individual case whether immunization has to be carried out or not.

3. The medical personnel who are very likely to be infected because of their work in the diphtheria-wards should be immunized only if the conditions of their immunity require it.

4. The serum has to be shaken thoroughly before each immunization is administered in order to mix the adsorbates in an equal ratio.

5. Immunization against diphtheria and scarlet fever can also be carried out with the mixed serum of di-scarlatox "Asid" or "Behring".

20. Pappataci fever.

Introduction.

Oberstarzt (Colonel, MC.) Prof. ROSE

The treatment of pappataci fever and its vectors, the sandflies, was put on the agenda of this committee in order to conclude the group of diseases common to countries with hot climates which are important in the areas in which the German Army has operated thus far. Though pappataci fever is a harmless disease as seen from the point of view of the individual patient, it may cause considerable losses and impair the efficiency of the troops at critical moments, when it sets in epidemically. The practical experience of the three last years has shown that fighting the breeding-places of the sandflies, as recommended in manuals, is pure theory not

borne out by practice. So far, we know neither any reliable means of fighting the larva nor any methods of ascertaining the breeding places suitable for use by the army surgeon. On the other hand the first experiments of indoor-control with the new contact-poisons "Gesarol" and "Gix" has yielded such excellent results that we may expect a decisive progress in disinfection against pappataci fever through the application of these poisons.

21. On Epidemiology and control of pappataci fever.

Stabsarzt (Captain, MC.) MUEHLENS

Pappataci fever is a brief febrile disease of short duration encountered in countries with hot climates which has a favorable prognosis without any complications.

It is important because of its epidemic occurrence among foreigners, its very high morbidity rate and its high tendency to relapses.

Epidemiologically important is the vector, the phlebotomus pappatasii.

In Crete the sickness rate of the single units varied between 0 and 90 per cent in 1942 and 1943. That 10 per cent did not fall ill though they were exposed as much as possible is not regarded as due to natural immunity. The soldiers who did not fall ill were rather generally not bitten by sandflies. There were never any sandflies in the mosquito-nets above their beds, whereas there were plenty of these insects in all other mosquito-nets.

The greatest number of sandflies are observed in old, narrow and dirty villages, where flat mud-roofs are predominant, but new brick-buildings and barracks were soon infested with sandflies, even if they stood somewhat apart. In Crete the phlebotomus pappatasii occurs even at altitudes beyond 500 meters. Units in villages at an altitude of 400 meters were affected with pappataci fever, even up to 35 per cent.

Sickness rates (in per cent) of pappataci fever and influenza.

Month	Crete 1942		Crete 1943		Sicily 1942	
	Pappataci	Infl.	Pappataci	Infl.	Pappataci	Infl.
January	-	0.60	-	0.47	-	0.24
February	-	0.60	-	0.75	-	0.25
March	-	0.70	-	0.80	-	0.23
April	0.10	0.50	0.04	0.98	-	0.19
May	0.76	0.58	0.44	0.54	-	0.31
June	9.05	0.70	4.17	0.39	-	0.51
July	7.75	0.38	7.39	0.14	-	0.63
August	6.69	0.17	7.76	0.11	0.30	0.48
September	3.91	0.28	5.48	0.08	0.54	0.34
October	1.20	0.20	2.60	0.11	-	0.30
November	0.30	0.30	-	-	-	0.25
December	0.10	0.40	-	-	-	0.27

Sicily has different epidemiological conditions and a climate slightly different from that of Crete, but these do not fully explain the great difference of the sick rates.

The annual peak of the sickness rate generally occurs in June. Owing to cool weather in the Spring of 1943 the peak of that year shifted to July. The beginning and the end of the pappataci epidemics coincide exactly with the flying time of sandflies. It begins at the end of May and lasts till October including the months with average temperatures of 20 degrees Celsius. and more.

In Crete the dry and hot south and south-east are more liable to pappataci fever than the north and west. Units having spent but one summer in Crete were affected twice as much as those living in Crete for the second year. Contrary to former notions immunity is acquired but only to a limited degree. With some units the percentage of relapses amounts up to 30 per cent. There was a proportion of 6200 patients affected the first time and 1261 relapses, 498 of which occurred within three weeks after the first attack and the other 772 within the same year. Relapses after short changes of station within the island or to the continent are frequent. Some soldiers were affected as often as seven times.

The term "pappataci fever" is unknown to the Greek population and Greek surgeons, though the disease also occurs among the natives.

The duration of the disease is reported to amount to 2 - 3 days generally. In Corsica a variety of the disease with a duration from 4 - 9 days is said to be prevalent. In southern Crete the duration of four days was predominant. Of 319 patients, 111 were ill for four days, 69 for three days, and 84 for five days.

Control measures cannot be started directly against the etiological agent, since one can lay hold of it neither in man nor in the open. A certain mechanical protection against the transferring insect is difficult too and has not yet been put into practice. A disinfection in the insect by killing all the sandflies in sick-rooms, similar to the malaria-disinfection proposed by Oberstarzt (Colonel, MC.) Prof. Dr. ROSE, may be effective, even if not completely successful.

Regardless of other considerations something should be done to fight the sandflies systematically, since they are a nuisance in the house and often disturb the night's rest.

If pyretheum compounds are used, it is most important that the upper parts of the rooms are adequately exposed to the vapor since the sandflies,with hardly any exception, sit directly below the ceiling in the upper sections of the wall, which is out of reach of the ordinary sprayers. Only by using vapor-generators can all the sandflies in the room be killed. It is often necessary to repeat the application within the same night, since many sandflies

will be new arrivals. Poisons retaining their effect a long time are more efficacious. Here, formalin and solutions of cresol, and best of all, the captured English preparation Malariol did valuable work. Since the introduction of the preparations Gix and Gesarol the problem of fighting the full grown sandflies is practically solved. Besides treating the walls and ceiling, the impregnation of the mosquito-nets is of importance, as otherwise the numerous sandflies sitting in the nets escape. Sometimes the impregnation of the nets along will do.

Mechanical protection is difficult, because the insects are so tiny. Particular attention should be paid to the danger of the insect's entering from the adjoining rooms. The normal mosquito-nets with 17 meshes per inch afford no protection. The necessary width of meshes is 26 meshes, but such narrow mesh materially impedes ventilation.

For the time being, insufficient knowledge of the breeding-places makes it impossible to kill the brood.

Personal experiments to locate larva and chrysalix failed. General cleaning aiming at the destruction of all supposed breeding-places requires enormous labor and promises only inadequate results.

22. Recent experience with pappataci fever, clinical aspects and treatment.

Stabsarzt (Captain, MC.) Prof. HOERING

As regards the clinical aspects of pappataci fever, the main problem is the suppression of the dubious and questionable diagnosis "Papp". It has been proved many times, that the diagnosis Pappataci is used much too often. This is dangerous, particularly in relation to malaria, and especially malaria tropica which must always be carefully excluded before the diagnosis "Papp" is made. Another danger is that of overlooking the frequent vague infections of short duration, several of which have been epidemiologically defined. This was through reports of their appearance accumulated locally and temporarily and in making the premature diagnosis pappataci only to set one's mind at rest diagnostically. On the whole by committing oneself to the diagnosis pappataci, one will too easily set aside an unprejudiced observation of the patient and an advance on fresh lines of scientific research.

It is strictly required, therefore, that at least some of the following symptoms are manifested, before the diagnosis pappataci is made: either the appearance of a group of cases locally and temporarily, which renders the diagnosis relatively certain (such as in the case of genuine influenza) or, in the individual case: a quite typical fever-curve, violent aching in the head and loins, conjunctivitis (so-called Pick symptom), no enlargement of the spleen, a moderate leukopenia, typical sandfly-bites

and scratches caused by them. Only when at least 3 - 4 of the symptoms mentioned are present should the diagnosis be made. All other clinical symptoms are more or less irregular. Even the long period of convalescence so often mentioned applies but rarely. Despite the seemingly mild symptomatology the diagnosis can be made clinically, even in the case of patients suffering from other diseases at the same time, e.g. malaria or typhus, pappataci can be quite satisfactorily discriminated from those.

The question of immunity is difficult to answer, because of the lack of efficient diagnostic laboratory-methods. It is supposed that the ostensible frequency of relapses in the same season is largely a result of unreliable diagnosis, as genuine relapses are very rare. On the other hand relapses in the following years certainly occur frequently.

As regards treatment for pappataci fever, no measures are necessary other than treatment for subjective complaints.

23. Essential facts concerning the fighting of sandflies.

Mar.-Reg.-Rat (Government Counsillor, Navy) WEYER

The sandflies which are limited to tropical and subtropical countries are injurious to health in many ways, They are of most practical importance as agents of Leishmaniasis. Within the Mediterranean region pappataci fever requires particular defensive measures against the sandfly vector. The principal difficulties in fighting sandflies are their small size and their living in hidden places, besides the fact that we know relatively little concerning their way of life as compared to the more important gnats. But more important is the fact that their habits of breeding do not allow any intense activity against the larva since the larva does no live in water, but on the ground, in rubble, vegetable refuse, etc., where they are difficult to locate; are never found in large numbers in a narrow space, as the gnat larva in the breeding-pools, and do live where the effect of chemical poisons is prevented by mechanical difficulties. The small size of the full grown sandflies allows them to creep though the meshes of ordinany mosquito-nets, at least if they have been fasting.

The detailed knowledge of the sandflies is limited because of special considerations. They have no striking morphological characteristics, which might afford the basis for synoptical determining tables. We still know too little of the importance of single species as vectors. For this reason there has been no clear-cut mode af attack against the sandflies as yet. On the other hand we know that some species are of particular importance, owing to their frequency and habits of life alone. To this group belongs for instance the phlebotomus pappatasii, which is supposed to play the principal part in transferring pappataci fever within the Mediterranean region. Since the phlebotomus pappatasii is a particularly large specias, it

is of practical possibility to differentiate it from other species. Lastly, our knowledge of the habits of life and breeding of the sandflies is still quite incomplete in many important respects. Owing to the various habits of life of the different species, supplementary observations, which are urgently needed and for which we have an opportunity now, are of practical use only if we are also able to differentiate the single species. For this reason, a modicum of systematic knowledge is indispensable even to the non-entomologist occupied with fighting sandflies. If a limited geographical area with only a few more frequent species is concerned, such a person will even get along with slight rudimentary knowledge. He must be acquainted only with the principal features of the life habits of the sandflies and with the methods suitable in each respective case. Some important characteristic features are illustrated by the example of the male hypopygium and the female spermatheca of phlebotomus pappatasii and phlebotomus sergenti.

24. Essential facts concerning the biology and fighting of sandflies.

Major Prof. LENZ

Measures against a noxious insect must be founded on exact knowledge of its structure and its biology.

Only in exceptional cases is it possible to fight the sandfly larva in mass breeding places. The insects generally occur in innumerable individual biotopes where they cannot be fought practically. In hot arid regions they find the high degree of moisture necessary for the first few stages of development of the larva only in deep wall-fissures and other deep small holes.

The full grown insects can be killed direct by chemical means in their daytime resting places, in bedrooms, and stables. These daytime resting places are certain dark nooks situated chiefly in the upper part of the room.

More efficient and easier is the use of the wall coating compounds Gix and Gesarol which retain their effect for weeks and kill the sandflies more effectively. It is even more to the purpose to prevent the sandflies penetrating into the rooms by closing the windows with narrow meshed wire and to protect the sleepers by bed-nets. The wire-netting must have a maximal width of meshes of 0.8 - 1.0 millimeter, that is 24 - 27 mesches per inch. Fabric gauze must have still narrower meshes or must consist of threads of strong fibre, Most efficient is the use of bed-nets, impregnated with Gix or Gesarol, since they may have wider meshes, viz. are more permeable to air, and yet prevent the sandflies from penetrating through the warning effect of the impregnation.

Discussion:

HARMSEN: During the months from January to April we observed, particularly on the Dalmatian coast district, in all hospitals minor epidemics of infection, corresponding to the clinical picture of pappataci fever and some even reported as such. After a sudden rise of the fever to more than 39° C., the temperature will remain high for three or four days and then drop rapidly. The main symptoms are violent headaches, which virtually cannot be allayed, and conjunctivitis. In most cases there are no catarrhal symptoms, no enlargement of the spleen and no typical finding of the blood. The feverishness was followed by a long state of exhaustion and slow convalescence. Malaria, spotted fever and so-called grippe infections could be positively excluded. Evidently it was a disease closely resembling pappataci fever, if it was not identical. There was no possibility of sandflies being the vector. Pappataci fever has been particularly frequent in the Dalmatian-Bosnian region for a long time and it seems probable that the virus can also be transferred by other means than by sandflies.

HOERING: I once more warn not to generalize about the diagnosis of pappataci fever. Similar infections, even if occurring in groups like that recently observed in Albania in winter, must not be diagnosed as pappataci fever.

Three weeks after the close of the pappataci fever season, several cases of pappataci fever were suddenly observed again in November 1943 in a hospital for tropical diseases at Salonika, after the heating system had been started when the nights became chillier. This had evidently stimulated some surviving sandflies to activity which were still capable of transferring the disease.

WEYER: The problem must be solved whether the pappataci virus can be transmitted by the sandflies to the following generation and how the first few cases of pappataci fever are to be explained, and, lastly, whether other species besides phlebotomus pappatasii are involved in transferring the disease in the Mediterranean region.

We need further data on the occurrence of sandflies, particularly of phlebotomus pappatasii, in order to determine the northern boundary of distribution of this species. The data available as yet are incomplete and partly unreliable. The dependence of distribution on the climate must also be examined more closely.

ZSCHUCKE: In Istria three day's feverishness will be followed by a 2 - 3 week's convalescence with such violent nervous disorders (Headaches, insomnia, depressions, lack of appetite), that the diseased Italian soldiers are by policy exempted from outdoor service for several weeks. The question arises, whether the same was observed with our soldiers in the region of the Aegean Sea.

LENZ: The fallacy of diagnosing pappataci fever during seasons when there are no sandflies is a well-known fact, and has been confirmed by my systematic researches, which showed that the first cases of pappataci fever are always diagnosed in spring, when the first sandflies appear, and that they cease in fall, when the sandflies disappear. During the whole pappataci period of summer the curves for frequency of sandflies and for the sick rate show the same tendency.

As for the question of virus-reservoir in winter I have begun to make experiments with the objective of proving the transmission of the germ to the next generation of sandflies. Though these experiments have yielded only negative results so far, the possibility of obtaining positive results in the end is not yet excluded, since the breeds available must be considerably increased and means must be found to work with larger numbers of patients.

The pappataci cases in November mentioned by Stabsarzt (Captain, MC.) Prof. HOERING seem to be a further confirmation of the theory of a transmission of the germ to the next generation of sandflies. I regard them as the results of an infection caused by a second generation sprung from infected sandflies which propagated in the course of summer. This second generation was evidently forced to premature puppation and development into full grown sandflies by the heating of the building begun in November. The full grown sandflies then caused the infection.

STELLWAAG: Wire-netting as narrow as required for protection of the windows against the sandflies cannot always be supplied and in addition is disliked for its interference with ventilation. We understand that even gauze with wider meshes impregnated with poisons like Gesarol may be used (which will scare away the sandflies). On the one hand these preparations being scarce are not available everywhere, and on the other hand the wire-netting is heated by solar radiation to such a degree that the effect of the poison will decrease rapidly (evaporation). But to repeat the impregnation many times does not pay. Perhaps an attempt at using the gauze with wide meshes covered with glue to which the sandflies will stick would be worth while. Caterpillar glue may be dissolved in carbon tetrachloride and sprayed on wire-netting. Since the sandflies alight on the gauze and then creep through it, a gauze with comparatively wide meshes might answer the purpose (even against culicides). A disadvantage of this method is that a gauze treated in this way readily becomes soiled, but even so it ought not to be difficult to clean it with a brush.

Information leaflet on pappataci fever:

1. Pappataci fever (three-day fever or dog fever, other names should not be used) is a virus disease and is characterized by a fever rising rapidly after an incubation of 3 - 8 days, but dropping again on the second to fourth day, which is associated with very

severe headaches (feeling as if the head was bursting) with pain in the muscles, conjunctivitis, cyanotic fascies, anoresdia and intestinal disorders. In most cases there is a remarkably pronounced relative bradycardia. A leucopenia occurs, but there is no enlargement of the spleen. The patients usually feel very ill, are frequently weak and much depressed psychically. Headches and giddiness will often outlast the defervescence by a few days. The average duration of incapacity for duty amounts to five days, the duration of postfebrile symptoms to a fortnight at the most. The prognosis is very favorable; cases with fatal issue practically never occur.

2. The vector of the disease is the pappataci sandfly (phlebotomus pappatasii), a small (1 - 2.5 millimeter), greyish yellow gnat, hairy over its whole body. Characteristically it holds its wings at rest like an angel, which is different from other gnats. It dodges any attempt to catch it. Its bite causes violent itching and often violent reactions of the skin.

The virus circulates in the patient's blood only during the first two days of the disease. It can be absorbed by sandflies only during this period; the sandflies in their turn can transfer it again to man by bite after a process of ripening and increase which takes 6 - 8 days.

3. The diagnosis has often been made even in regions in which the vectors do not live at all, viz. the disease cannot occur. But even in regions in which the disease is spread, the diagnosis has been erroneously applied for short or even lingering infections, etiologically obscure, though epidemiological considerations, season, and manner of occurrence positively excluded pappataci fever.

4. Before filing his report, the army surgeon should convice himself that there are sandflies in the area, without which the disease cannot occur, if necessary by consulting a hygienist or an entomologist. Among the present areas of operation the occurrence of sandflies may be expected in the whole South-East (altitudes exceeding 600 meters excepted) particularly in the coastal districts of the Mediterranean during the period from summer to early fall (from the end of May to September).

5. Under certain circumstances pappataci fever may affect large numbers of the troops within a comparatively short time and incapacitate them for duty, even if only temporarily. In the region in which the disease is present, danger of infection exists, above all if the troops are billeted in towns and villages, since man will create places for refuse there, which promote large scale propagation of the agents. Destruction by war with accumulation of debris and rubble also creates favorable breeding-conditions for the sandflies. Tent camps will not be affected as a rule.

6. As regards differential diagnosis, malaria, particularly malaria tropica, must always be excluded first. In all events the thick smear must be examined with this in mind. On the whole the diagnosis of pappataci fever is to be made chiefly by exclusion. Other infectious diseases in their initial stage (particularly those with conjunctivitis, such as spotted fever, smallpox, measles, dengue, even hepatitis epidemica etc.) and above all, the frequent non-characteristic febrile infections (Influenza) produce quite similar clinical pictures.

7. Pappataci fever, once overcome, generally leaves behind a relative partial immunity. Relapses have been observed even after a fortnight. Several relapses may occur.

8. The treatment is symptomatic: bed-rest, fever diet, with possible use of antineuralgica (with hardly any effect). Sulfonamides are of no effect. The most apprehensive patients should be calmed by pointing out the favorable prognosis.

9. The disease can be prevented through protection from sandfly-bites. The normal mosquito-net does not answer the purpose owing to the small size of the sandflies. Only nets with at least 10 threads per centimeter afford any protection, but they considerably impair ventilation and passage of heat from under the net. The small range of flight of the sandflies (about 50 meters) may have the result, that, according to the situation, some rooms are violently infested while other rooms in the same building are not infested at all, and that in isolated houses, even sleeping on the roof will afford some protection.

10. Particular attention should be paid to the protection of specialists (such as flying personnel, signal corps men), since their being affected by this otherwise comparatively harmless disease makes itself felt more than in other branches of the service.

11. Measures of defense: It will hardly be possible, as a rule, to eliminate the breeding-places. They are to be found in crevices of the ground and the walls, at stables, in heaps of refuse, dung, and straw etc. They require a certain moisture and darkness. Mass-breeding places are destroyed houses etc.

12. The full grown sandflies can be killed in their daytime resting places in bedroomsand stables (dark, draught-proof nooks, mostly near the ceiling) by direct spraying with chemicals (preparations containing pyrethreum, such as Flit, Detmolin, even diluted solutions of cresol or formalin). The method of using Gix and Gesarol as a wall coating is more reliable and easier, since they retain their effects for weeks. The most suitable method is the use of bed-nets impregnated with Gix or Gesarol (moisten the nets with water and then immerse them in a solution containing 1 per cent Gix or Gesarol).

VIII.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON INTERNAL MEDICINE

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor

Office of the Military Government (U. S.)

Present experiences while carrying out immunizations against diphteria and scarlet fever (see Sect.7 Articles 14 - 19)

Concerning the need of calcium in the food of troops (see Section 14, Article 9)

11. Experiences in the formation of "Stomach Battalions".

Oberstabsarzt (Major M.C.) Prof. v. FALKENHAUSEN

In July 1943, a special unit for patients with gastric complaints (abbr. "M-battalion") was first formed in the VIII. Military District. The reason for this was the increasing number of patients with chronic gastric complaints which led to an intolerable overcrowding of the internal medicine departments of hospitals and dispensaries. The "M-battalion" was to provide profitable employment with consideration of the special needs of these patients especially as to their diet and their assignments. At first, all military personnel of the military district under treatment with these conditions (L52) were examined by an experienced specialist to determine their fitness for the "M-battalion". All those considered unfit because of a serious disease were discharged. The rest formed the nucleus of the "M-battalion" which was meant to be a training unit for the creation of field formations. In the long run it turned out to be useful to establish a special hospital for gastric complaints in Freudenthal where this "M-battalion" was stationed which was used also as a hospital for the reception of patients with gastric and intestinal complaints. That meant that all patients with gastric and intestinal complaints coming back from hospitals to the VIII Military District were transferred to this hospital for a final evaluation of their fitness. Thus the increase in strength of the "M-battalion" was well regulated.

The men of the M-battalion can be divided into two groups. Besides the small group who have only gastric complaints there is the other, much larger group, whose gastric complaints are overshadowed by other functional disorders and these complaints are only one symptom of the sick individual. Previously these men were sent from one hospital to another and a great number of them never received complete training anywhere. They are the type of weak plaintive individual who takes too gloomy a view of his complaints and constantly refers to them. It is the most important task of the "M-battalion" to train these persons and to increase their efficiency as much as possible. The individuals with only slight gastric complaints and whose ailments are chiefly psychic will be treated by a psychotherapist. If he thinks them fit to be trained, they will stay in the "M-battalion" in spite of their slight gastric complaints, so that they will no longer be repeatedly haunting the sick bays and hospitals. Only those psychopaths who cannot be trained are regarded as unfit and are discharged.

The care and treatment of the "M-battalion" has to be undertaken by an experienced internist who cannot be deceived by the psychopaths deceptions.

Every man in the "M-battalion" is listed on a card index of the army physician which contains all important history and examination dates with the findings. This record will be given to the accompanying army physician when the men are assigned elsewhere for service. The army physician divides the individuals into three classes according to their respective fitness. The classes are formed into platoons or companies according to the number in each group and the only difference will be the duration and the severity of duty. The training course of the "M-battalions" presupposes nothing and will be held in two courses of six weeks for individuals and groups including all branches of infantry service.

Observation of the weight is considered to be an important factor for the justification of a sick report. If an increase of weight develops during the treatment for a gastric complaint, the latter will usually not be of much significance. Because of this fact, a great number of sick reports can be rejected as unjustified. Necessary medical examinations are to be carried out in the sick bay if possible, which is provided with all the paraphernalia required. On the one hand the patient must feel that the physician treats his complaints seriously, on the other hand he must know that occasional complaints such as pyrosis and a feeling of pressure do not justify release from service. The mental attitude of all men of the"M-battalion" has to be continuously observed and supported by the unit physician and the unit commander. The success of the battalion depends on their personalities. It has generally proved a failure to select officers out of the group of men suffering from gastric complaints. The officers must have a proper understanding of the balance between demands and efficiency and even when off duty they must take continuous care of their men. This duty will be too great a strain for officers who are ill themselves. On the other hand, however, it is positively astonishing what able and energetic officers can develop from their men. Such company commanders succeeded in making fit about 90% of their patients for active service after a period of training.

To guarantee a constant treatment of the men of the "M-battalion" they must be prevented from gaining admission to other hospitals by reporting sick with other formations, especially during their leave. This was done by making an entry on page 12 of their pay book that in case the bearer reports as sick he has to be transferred to the special hospital at Freudenthal if he is able to travel. This measure materially diminished the frequency of sick reports during leave. In the same way men requiring hospit treatment from active field units are sent back to the special hospital at Freudenthal (except for instance in cas of infectious diseases and wounds etc.) Even if sending t back to other hospitals cannot be avoided, it is urged by the entry in the pay book that they be sent to Freudenthal as soon as they can be moved. It is only in this way that

a uniform and permanent supervision and treatment of the patients can be achieved and this is considered to be one of the most important tasks of the special hospital .

The advantage of the "M-battalion" has been evident in VIII Military District. You can observe everywhere a decrease of work in the dispensaries and internal medicine wards of the general hospitals in the home country as regards the men with chronic gastric complaints whereas they used to be sent there again and again. The active units coming from the Freudenthal special hospital have proved very efficient. It must be stressed, however, that such a success is only attainable if the gradual training is done in the way described above, which aims at educating, training and leading the patient in a sympathetic but energetic way and to keep him in that special unit under any circumstances. This task can be performed only by officers who are not only able but also keen on this special task.

2. "Stomach Battalion" and dietary maintenance in the field and reserve army.

Stabsarzt (Captain M.C.) KALPEN

All men who suffer only temporarily from diseases such as enteritis, bullet wounds in the stomach, hepatitis, etc., are not suitable for the "M-battalion". Only those men are to be discharged as unfit for active service who suffer from that kind of gastritis which leads to a permanent influence on the physical condition with a steady decrease of weight in spite of medical treatment. All men with ulcers are fit. They are treated, if necessary, in our special hospital until they have been thoroughly studied including X-rays and gastroscopy. It must be borne in mind that being free from pain alone is no criterion of the ulcers being properly healed. Chronic ulcers which recur at short intervals are to be regarded as unfit. It is a special task of the "M-battalion" or rather of the special hospital for gastric complaints to separate the diseases which are mainly functional from those which are mainly organic and to ascertain if possible the degree of activity with ulcerous processes. The differential diagnostic symptoms with a florid ulcus or a scar are described in detail. It must be borne in mind that the ulcer complaints may be the manifestation of a fictitious neurosis which affects the internal organs. This was emphasized by NONNE, with whom I fully agree after my year of experience with the "M-battalion". Especially suitable for the "M-battalion" are all those cases with scars. Even patients with stomach resections are suitable if the remaining portion of the stomach is large enough, the general physical condition satisfactory and if only small inflammatory changes can be detected. Patients with a small stump requiring frequent feeding, and with serious inflammations are to be discharged as unfit. The most important principle for admission is to decide the question, whether or not the efficiency can be increased, or at least can the pain be alleviated by dieting. That is why patients with cholecystitis, gall-stones and inflammation of the bile-duct, dysentery etc., are admitted. The dietary supervision and treatment is very important.

The troops get the food ration of group III, which contains 700 grams of bread, 40 grams of fat and 1200 grams of vegetables and potatoes per day and 700 grams of meat per week. They get white bread instead of black bread. Because of the different kinds of patients in the battalion, as for instance with diseases of the liver, gastric and intestinal complaints, and the indigestibility of artifical fats, artifical honey and jam, the fat ration was given as butter. Vegetables are usually prepared. Potatoes are served as mashed potatoes by adding milk or skimmed milk. This diet was given not only in the home country, but also to the troops in the field. The necessary diet kitchen utensils such as meat choppers, potato mashers, pots and pans, sieves, bolters, griddles, ladles, colanders etc., are brought along from the former location.

When sent on field duty the troops need additional medical equipment besides "T.S.A." (the normal set of Medical Supplies and Equipment for the Armed Forces), an X-ray apparatus (heavy) a scale and endoscopes, gastric tubes, etc. The units have to be fully equipped with medical instruments and kitchen utensils before a battalion is sent into the field. The supply of the required medicaments must also be provided. It is necessary, that the army physician and the army officer make every personal effort to carry through every measure contributing to the ultimate success. In spite of the physical strain of field duty the number of men suffering from ulcers has become much smaller than previously when they were on duty in the home country.

The "M-battalions" prove that it is possible to mobilize still larger reserve forces and this measure will at the same time be useful and advantageous to the patients themselves.

Discussion of the lecturers concerning "M-battalions".

KATSCH: Not every officer suffering from gastritis is capable of leading a stomach battalion. If he is able, however, his example will be of great value.

It is still difficult to find the right officers suffering from gastritis for the stomach battalions. It has to be avoided that persons needing special diets and being treated according to L 52 should be admitted to the stomach battalion. Above all they are not to be kept there for any length of time but are to be discharged as soon as possible (for instance after hepatitis, after a cecum operation, after herniotomy).

GUTZEIT: The efficiency of stomach battalions has been variable when used for covering and mopping up operations according to their training in the home country and according to the consideration and security of the special conditions of the location of their activities. They were used successfully when an energetic and intelligent corps of officers as well as an able army physician trained and selected the men in the home country and where in the field the possibility of thorough medical supervision as well as the appropriate diet was maintained. The efficiency of the "M-battalion" depends absolutely on the fulfilment of these last two conditions. Too hasty order for formation, insuffi-

ciency of staff (cooks, medical officers, commander or technical equipment, X-ray apparatus, instruments for stomach examination and treatment, field kitchen utensils etc.), prevent the efficiency as well as the distribution of the units over too wide an area. The rate of sick reports was about 10% of the men with a battalion on guard duty, of these only half of the soldiers suffered from gastric complaints. With a third battalion which was distributed over a larger area (400 kilometers) the number of sick reports was much higher (up to 35%). The number of sick men depends furthermore on the qualities of their leaders or the commanding officers. Therefore they should be assigned to the unit while it is being formed and they must be selected carefully. It does not matter much, whether they are suffering from gastric complaints or not. A general prohibition of smoking is not necessary, nor is a general exclusive supply with white bread. In one battalion only 50% of the men needed white bread. The prohibition of smoking and the supply with white bread are therapeutic measures and are to be decided in each separate case according to its individual merits.

SCHUERMEYER: In the Navy we have an experience of about three years with "dietary" units. After a central "M-battalion" has been established in the naval collecting hospital the patients are distributed from there to the suitable units which provide the appropriate circumstances. The fitness for service of the patients has been increased materially and the number of sick reports has decreased a great deal. The establishment of a dental clinic in addition to the diet kitchen is of importance.

BAADER: The "M-battalion" of the VIII Military District stationed in Lille has stood the test well.

SCHLUETER points out the difficulty of taking care of the "M-battalions" by an army physician if they are used in an unsuitable way (e.g. guerilla warfare with the danger of being surrounded by the enemy temporarily).

UHLENBRUCH: According to the theory of the "M-battalion", those patients classified in the group L52, who are often psychopaths and disposed to depressions are to be imbued with a positive soldierly bearing. In the long-run, we take the risk that on the other hand soldiers coming from field units who have performed their duty previously without bothering about their gastric complaints (the achievement of men with chronic gastric complaints are often surprising) may use every effort to be sent back to the special battalions. This danger would increase if other groups of patients should be formed into special units.

3. Fitness for service of diabetic patients and the question of their unfitness for active war service.

Oberfeldarzt (Lt.Col., M.C.) Prof. KATSCH

Physical work is advisable for all kinds of trained diabetic patients with a reasonable attitude. They are healthy under certain conditions which does not always mean fit for service under certain conditions, at least not for all patients by any means. The dieting must not interfere too much with the necessity of having their meals in common with their comrades. Slight modifications of the military dietary would provide certain possibilities of extension and

selection. In the life of a soldier, the necessary regularity of meals, which is important for most diabetic patients, especially those under insulin treatment, is difficult. Physical strain after an insulin injection is apt to decrease the blood sugar considerably and even if no unconsciousness and convulsions occur, the consequences are not only reduced efficiency but include cerebral reactions like stubbornness, states of intoxication and frequently violent behaviour. Diabetic patients might be employed in special local units of the German Labor Service with a settled routine. Units for diabetic patients should be subject to static conditions. Their fitness for service would be more limited and narrowly circumscribed than that of a "M-battalion" kept to a certain diet. Such an organization is in general not to be recommended.

Patients affected with mere renal diabetes are fit for service. Some patients with slight diabetes who need no insulin are fit for service under certain conditions, especially officers and persons of higher rank. The use officers, sergeants, medical officers and administrative officers who need insulin, in some special cases even troop officers as reserve troops is to be recommended, if possible in their native village, so that an appropriate diet will be guaranteed.

Untrained diabetics of the rank and file who need insulin are unfit for service, especially if they have had no military training and should not be drafted.

Seriously wounded diabetics who need insulin cause great medical difficulties.

As to the question of disability due to active war service for diabetics still other causes of manifestation are to be considered besides an inherited disposition for a special disease. Diabetes may be caused or aggravated:

1. by different kinds of infections, also suppurating wounds in individual cases after hepatitis epidemica, protracted malarial fever and typhus,

2. by severe infectious pancreatitis and traumatic pancreatitis ,

3. by wounds in the head caused by bullets, symptoms often appeared after an interval of delay,

4. by concussion of the brain (but only exceptionally)

5. by a coma occurring during the time of service if the aggravation factor could not be compensated by hospital treatment,

6. by physical and mental strain if it can be proved that it considerably exceeds the average. This question is very difficult and requires great responsibility on the part of the specialist.

7. the same may be said of hormonal changes by permanent effects.

8. by medical treatment if it was inappropriate or not given in time.

The next sentence in the German text is garbled (Editors Note.)

Disability for active service cannot be caused by average physical strain or heat in a southern climate or frostbite if no serious infection occurs.

4. On the treatment of diabetes mellitus.

Professor NONNENBRUCH

Even before insulin was discovered KOHLISCH, CARL v. NORDEN, and FALTA demonstrated the favorable effect of a diet rich in carbohydrate and lacking protein and fat on the diabetic patient. It is the same with a diabetic treated with insulin. The normal diet of to-day has proved very favorable in this respect. By the additional food rations for diabetics approved by the chamber of physicians of the Reich, the fat and protein rations have been doubled. With this additional ration the diabetic patient gets 1 gram of fat and 1 gram protein per kilogram of his weight and has to supply the deficiency of calories with carbohydrates, so that even with this additional food he depends upon an ample supply of carbohydrates. Owing to the present scarcity of insulin it is an important question whether the cutting of additional food rations and the making up of calories by carbohydrates instead of protein and fat leads to an increased use of insulin. If so, we would better dispense with the additional food in order to save valuable insulin. According to our experience the food of a normal consumer with its low content of protein at present has served very well and led to no increase of the use of insulin. Therefore it is to be recommended that the diabetic be granted the food of a normal consumer. Diabetes itself does not exclude a fitness for active service. The fitness for service depends on every individual case on the intelligence and strength of mind of the diabetic. In a case of my own a seriously sick diabetic (a youth) grew into a well developed young man and succeeded in passing the final school certificate examination by adequate treatment, he applied afterwards for service in the air force, concealing his diabetes, and did his duty satisfactorily for several years in a heavy anti-aircraft battalion. Some months ago when he was proposed for the rank of a reserve officer the diabetes was discovered during another medical examination and he was declared unfit for service. The young man was in excellent spirits during the years of his service, because he was convinced that he was now at last fully appreciated. As a soldier he ate the normal food of the field kitchen and in addition to it took 80 units of depot insulin and additional injections of old insulin whenever he felt that he needed them. The discharge from service depressed him deeply.

Discussion of the lecturers concerning diabetes mellitus.

GRAFE: Because of the war it was necessary to increase the ordinary pre-war supply with carbohydrates (about 100 - 150 grams). Besides that NONNENBRUCH and his collaborator FEUCHTINGER, tried increasing the supply of carbohydrates to about 350 grams as granted to a normal consumer but if possible with the same amount of insulin. The idea of a diet rich in carbohydrates or free choice of any food is not new nor did Dr. NONNENBRUCH say that. In some cases it is without doubt possible to secure a higher tolerance of carbohydrates without increasing the supply of insulin proportionally. We have in our hospital all the time about 30 - 40 diabetics so that we are able to study all these questions of diet with a great many people and on a large scale. The examinations in civilian as well as in military hospitals showed that the cases described by NONNENBRUCH and FEUCHTINGER are exceptions and not the rule. Moreover it would be very interesting to know what happened afterwards to these patients.

43 cases of not too serious and serious diabetics who needed insulin showed that an increase of the supply of carbohydrates of 24% meant an increase of insulin of 28% an increase of carbohydrates of 30-70% on an average (46%) an increase of insulin of 30%, an average increase of 86% of carbohydrates an increase of insulin of about 46% and an increase of carbohydrates of 140% an increase of insulin of about 70%. In all these cases the supply of carbohydrates has been increased to at most ~~to~~ 300-350 grams, in most cases only to 250 - 300 grams.

The result of this large number of examinations, which is verified by numerous observations of the civilian department of the hospital proves that an increase of the supply of carbohydrates is of course possible but that at the same time the quantity of insulin has to be increased though the amount will always vary and be insignificant.

In one case the supply of carbohydrates was increased temporarily from 300 grams to 600 grams with the catastrophic consequence that extraordinarily high excretions of sugar occurred with an immediate decrease from 400 grams to 80 grams sugar per day. The excretions of sugar were so strong that insulin had to be injected, and so that even 100 units of insulin were required to make the sugar disappear from the urine. It took five weeks before the severe injury to the carbohydrate metabolism had been removed and the former state had been obtained. Such a case shows how dangerous it may be to increase the supply of carbohydrates extensively.

The continual clinical examinations have the advantage of being very exact. More important, however, is the question of how the situation develops when the patient is at home. Continual investigations of the treatment of diabetics give the best information about this subject. Prof. OBERDISSE and his collaborators (FLECKENSTEIN, NAGEL and BEUEL) traced the fate of 190 diabetics who underwent treatment at the hospital during the last five years. This showed a distinct improvement of the condition of nearly all diabetics during the first few years of the war with ordinary food and the usual additional supply of carbohydrates of 120 - 140 grams on an

average. Their condition was even better than in peace time. This improvement changed to an aggravation as a rule since we have used larger quantities of carbohydrates (up to 250 grams) in the outpatient department. In all cases a compensation of the carbohydrate metabolism was tried, although it was not possible to do this with the same exactitude as in peace time. Thus we had to put up with an increase of blood sugar up to 0.17% and excretions of sugar up to 15 grams per day. We observed that the demand for insulin increased on the whole by about ten units per 100 grams of carbohydrate. Even in this case the result is the same, an increase of the supply of insulin, though a comparatively smaller one than the increase of carbohydrates.

In my opinion we shall have to make a compromise by granting the diabetic patients who need insulin, who at present are one half of them, a medium quantity of carbohydrates from 200 - 250 grams. To discontinue the granting of additional food to diabetics is not possible.

SCHENCK: There are two tendencies regarding the judgement of the granting of additional food to diabetics.

a) increase and steady recourse to the maximum rations of additional food.

b) discontinuance of the granting of additional food with the aim to release food for other purposes.

The latter tendency is of vital importance at present to diabetics and to patients with gastric complaints. The statements on which the demands for discontinuation are based are neither well founded nor true.

A discontinuation of the supply of additional food for diabetics is out of the question and not intended. In the first place because the psychological effect would be very unfavorable. In the second place, it would require a complete change of treatment of many thousands of diabetic patients which would be impossible at present. In the third place because the observations on which the demands for discontinuation of the granting of additional food are based have not yet been reexamined sufficiently.

SCHULTEN: The increased demand for insulin during the war is not only caused by an increase of the consumption of carbohydrates by diabetics but also by prescribing insulin for nondiabetic patients, above all those suffering from hepatitis. This latter should be stopped altogether, because it is useless.

LANGE: In the IV. Military District a special unit has been formed for diabetic personnel. According to the status of 15 April 1944, 1229 diabetic patients had not been drafted, 949 had been discharged as unfit for service. After setting aside indispensable diabetics 360 are available for active duty. They are employed for guarding prisoners. A physician experienced in the treatment of diabetes was assigned to that unit. Experience with these measures is to be described later.

Directives concerning the treatment and evaluation of diabetes mellitus.

The aim of the treatment of diabetes is a regulation of carbohydrate metabolism with a tolerance of carbohydrates as high as possible and a supply of insulin as small as possible. Whereever it is possible an approach to our present food ration which contains little protein and fat is to be obtained. An individual treatment and control of the food intake is necessary in every single case.

Cases of mere renal diabetes are fit for service. Diabetics with a tolerance of more than 500 grams of carbohydrates without insulin are also fit for service. Those with a limited tolerance, as also those in need of insulin, have to stay at their place and are fit for service in the reserve and have to maintain themselves. This especially applies to soldiers on active duty, higher ranks and officers.

Diabetics without military training who need insulin are not to be drafted.

Diabetes is in most cases inherited. Diabetes acquired only after pancreatitis or following injuries in the head is a very rare case. Even with an inherited disposition for that disease there are causes producing the symptoms and aggravating them which accelerate the outbreak and lead to a more serious prognosis. Such are, besides serious injuries to the stomach and the brain serious, especially chronic, infections, suppurations or previous states of coma. In all cases the question of the influence of the war has to be answered in the affirmative . Physical strain cannot be made responsible for the onset or an aggravation of diabetes. Exceptions are only possible if it can be proved that the patients have undergone excessive and abnormal physical and psychic strain. Each case must be judged on its own merits and it is sometimes very difficult to arrive at a definitive decision.

5. Concerning the treatment and evaluation of rheumatism and neuritis. Aggravation and psychic fixation.

Oberfeldarzt (Lt. Col. M.C.) Prof. BECKMANN

In the winter 1941/42 polyarthritis had a high incidence in two armored tank regiments which were living in overcrowded conditions, as a sequela of an angina epidemic. 10% of the soldiers were afflicted with the disease for about a year and their number did not decrease until older men were drafted into these regiments. This observation emphasizes the idea that it is chiefly the tonsils which are a focus of polyarthritis among younger men. The therapy of acute polyarthritis has to be started with a big dose of salicylate (8-10 grams) or pyramidon (2-3 grams). They have to be administered until the acute inflammations have subsided for the most part. Then the dose should be reduced slowly by stages. Intensive therapy with large doses for only 2-3 days has proved a failure. As soon as the tendency to a

fixation of single joints manifests itself passive exercises have to be started. In milder cases the patient may be urged to exercise his limbs himself, even during the initial stage. Very early hydrotherapy (thermal baths) may be applied in individualized plans as soon as the temperature has become normal, even if the blood sedimentation rate is still high. Usually the sedimentation rate returns to normal again relatively quickly with the baths. The most important thing is the exercise of the limbs . Greater mobility is the chief aim, the exercises are the way and the hydrotherapeutic measures are the means to make the exercises easier. In order to strengthen the reaction of the body all other physical measures are to be employed (mud baths, underwater massage, slowly increasing individualized gymnastics, later on walks under supervision and sport.)

Cases of acute and chronic polyarthritis must not stay too long in the general internal medicine wards. If no appreciable progress has been attained after six to eight weeks, they are to be transferred to a special hospital for patients with rheumatism. On the other hand, not every healed polyarthritis has to be treated by baths. This is only to be considered if disturbances of function still exist. In this way the long duration of the disease might be shortened considerably in many cases. A separate establishment of general hospitals, special hospitals for rheumatic patients and hospitals for convalescents as proposed by TICHY is not required. Complete convalescence can be achieved in a special hospital for rheumatic patients. It is not necessary that the patients should have become free of all complaints. The further supervision has to be undertaken by an army surgeon who must be thoroughly informed in this field. By this plan it is possible to render the majority of the patients fit for service again in well appointed special hospitals. Chronic and constantly relapsing cases are to be discharged in due time as unfit.

Vegetative dystonia is much more frequent with rheumatic patients than with other diseases (6% as compared to 3.8%). Psychic fixation is frequent in the beginning in cases of persistent pain, but disappears with increasing improvement and increasing ability to move. It very seldom grows worse. Simulation of polyarthritis was observed in only one case.

For the treatment of sciatica the same points of view obtain. Exact diagnosis and exclusion of all other organic changes are required, (arachnoiditis, meniscus prolapse, sacralization, static moments, etc.,) and these procedures are best carried out in a special hospital for rheumatic patients or on observation wards. Sciatica showing no improvement within four weeks has to be transferred to a special hospital. We shall succeed in rendering fit for active service a great many sciatica patients within 6-8 weeks by special treatment which lays particular stress on systematic muscular exercise. Chronic and relapsing cases are to be discharged as unfit. Among 89 serious stubborn cases definite deterioration was observed in only one case, while in two cases there was a suspicion of deterioration and in 12 cases strong psychic factors played a role. 54 cases suffered from involvement of the nerve root (in the form of arachnoiditis) was observed and five from intervertebral disc prolapse. Strong

psychic influences are much more frequent with sciatica patients than with polyarthritis patients.

To be successful it is essential that the special hospitals for rheumatic patients have available a sufficient number of well trained personnel (women trained in gymnastic exercises and masseuses). The baths are to be given in the hospitals if possible. Of special importance is the supervision and care of the patients by an army surgeon after their discharge from the hospital.

6. Concerning the treatment and evaluation of Rheumatic fever and Neuritis. Aggravation and Psychic Fixation.

Stabsarzt (Captain M.C.) Prof. PANSE

I think a psychiatric concept of rheumatic fever may contribute considerably to a solution of the complicated problems of the rheumatic diseases. Though modern investigations of rheumatism have widened considerably the knowledge of etiology and pathology, the physician and the patients still cling to traditional and vague notions concerning rheumatic fever. Often a diagnosis is established which has no objective basis. This causes vague misgivings to the patient and induces him to fear that he may be afflicted with the disease. The results are those frequent psychogenic symptoms and fixations accompanying rheumatism concerning which I intend to speak principally.

Acute articular rheumatism, rheumatic fever, implies a psychic burden by its organic consequences e.g. with myocarditis, inflammation of the serous membrane, or during relapses which cause psychogenic reactions. This is especially true with the numerous cases of chronic and relapsing arthritis which may be differentiated from genuine rheumatic fever and must be traced back to focal infection. The frequent uncertainty as to the etiology, the vague nature of the complaints, the resultant diagnostic uncertainties and the attempts to find the focus aggravate the feeling of being sick and draw the attention of the patient to the physical processes, by which a hypochondriacal psychogenic attitude may easily be caused which in time becomes fixed and can be removed only by effective suggestion therapy.

The more localized the rheumatic symptoms are the more frequently will the forms of strong psychogenic reaction be transformed from a general hypochondriacal dejected attitude with the typical " facies psychogenica" to circumscribed relief attitudes, anomalies of attitude and contractures of the affected parts. The great numbers of localized infectious arthritis of the spine and several larger joints are to be specially mentioned. The soldier at first is led to close self-observation by the steady dull pain and the increased pain with certain movements. Relieving, evading and protective postures are assumed which may become grotesque, stereotyped and quite unconscious. The resultant state can be explained etiologically only by close cooperation of the in-

iste with the orthopedists and the psychiatrists with the neurologists. Even serious changes of posture and contractures which have been considered to be organic for years, have been proved to be psychogenic and susceptible to removal.

These psychic influences are by no means always hysterical, that is they are not so often malignant as is generally supposed. Chronic rheumatic diseases are often unconsciously caused by a steady fear of disease and an abnormal fixation of the attention on the processes of the body. They are seldom really hysterical or demonstrative and have therefore nothing to do with genuine deterioration or simulation. The latter is the case far more often with acute neuritis and neuralgia, with which patients often show a tendency to evasion. The more chronic these states are, e.g. with sciatica, neuralgia of the brachial plexus or frequent acute infectious polyneuritis, the more the psychogenic processes resemble those of rheumatic fever.

The psychic reactions are due to autosuggestion and can be removed only by suggestion therapy. Every well planned and purposeful program of therapy carried out by a physician with healthy optimism is valuable in this respect, and can avoid the development of psychogenic influences. Aimless diagnostic and therapeutic attempts have the opposite effect. If, however, psychogenic influences have once appeared, only consistant suggestion therapy will be successful.

The following procedure has proved especially successful even in the most serious cases. The treatment by suggestion begins by using a diagnostic apparatus with unobtrusive optimism and with a number of special examinations adapted to the complex of complaints. The "favorable" result is assured every time and the eventual certain cure is stressed. All the time the physician must systematically avoid permitting the patient to know whether he considers his condition as psychogenic or organic. The physician must not allow any doubt or other influences to be reflected in his manner no matter how well justified they may be. Then a powerful galvanic current is applied at short intervals together with verbal suggestion. This treatment represents an impressive experience, the effect of which practically never fails with a man who is well prepared by suggestion therapy. It is advisable to reserve the treatment itself to the neurological wards of special hospitals adequately equipped for the purpose and containing a large number of organic cases for the physician too has to be thoroughly familiar with this treatment and surroundings furthering the suggestion are indispensable.

Directions for the treatment of rheumatic fever and neuritis

1. Cases of polyarthritis or sciatica showing no particular tendency to improve within four weeks have to be sent to a special hospital for rheumatic patients.

2. A thorough elimination of all foci of infection is absolutely necessary. Salicylate or pyramidon treatment in high doses is not to be carried through for a short time only, but until the acute symptoms have disappeared. Then the dose may be reduced slowly.

Passive or active exercises are to be applied early. Hydrotherapy may be begun after the fever has subsided even if the sedimentation rate is still above the normal.

3. The special hospital for rheumatic patients must have at its disposal a rhinolaryngologist, an otologist and a department of dental surgery. Baths shall be furnished in the hospital if possible. The hospital for rheumatic patient should be fitted out with sufficient personnel (personnel for gymnastics, masseuses).

4. Psychogenic influence and disposition to aggravation (mostly in the form of compulsary and relief attitudes) are more rare with polyarthritis than with sciatica and other kinds of chronic neuritis. Psychic guidance by a physician is essential. Serious and persistent cases shall be sent to a naurological ward established for that purpose as soon as possible, for a proper treatment by suggestion.

7. Concerning the evaluation of non-organic heart diseases (vegetative, postinfective and other types).

Oberstabsarzt (Major M.C.) Prof. BANSI

Non-organic heart diseases are extraordinarily frequent. Their evaluation is very difficult especially for younger physicians who adhere too much to the minor findings of the technique of diagnosis in their judgement. The evaluation of this big group of soldiers with strong subjective heart complaints was discussed even during World War I.(WENCKEBACH).

If organic heart complaints are to be set aside after a thorough general examination and detailed clinical study, a clear opinion is to be given.

Classification

1. Hypertonia without anatomical dilatation of the heart and involvement of the kidneys.

2. Disturbances of the circulatory control center.

3. Vasoneuroses, including angina pectoris spuria nervosa, In addition are to be mentioned:

4. Postinfectious instability of the circulation,

5. Heart complaints after injuries to the lungs and

6. Neurovegetative disturbances of the central regulatory mechanism chiefly on a hormonal vegetative basis.

Hypertonia: Variable systolic pressure without anatomical changes of the heart muscle which can be observed very often with young people is unimportant (Class A-defect). The same applies to abnormally high and slowly decreasing blood pressure reaction to exercise. Blood pressure which is constantly above 145 without involvement of the kidneys and heart hypertrophy are to be considered as class B-defects according to the regulations of last year. One must

search for infectious foci as a cause of hypertension.

Disturbances of the conduction mechanism: Uncomplicated ventricular extrasystole which does not increase with work is not important (class A-defect). If the extrasystole increases with work or if it is of multifarious origin, myocarditis must be supposed. The latter is usually a sequel of chronic or acute infection. After three months another examination and evaluation of the symptom which was considered as a Class L-defect previously must be carried out. Supraventricular extrasystoles are to be considered as a Class B-defect just as is sinus rhythm which appears in the state of rest, if no other symptom of a heart muscle defect can be ascertained.

Essential paroxysmal tachycardia prevents the fitness for service during the attack. According to the frequency of those attacks a Class B-or L-defect must be supposed if other organic findings are absent. The same applies to the electrocardiogram (EKG) finding of the so-called Kent's bundle, in which case occasionally abnormal conduction mechanism may set in with exercise.

The most frequent of all obscure non-organic heart troubles are the circulatory neuroses of patients suffering from neurocirculatory asthenia. These patients are in most cases very unstable and generally inefficient individuals with numerous subjective complaints and symptoms connected with the vascular nervous system. They are not easy to train and are, especially if symptoms of the sympathicus are predominant, usually very uneconomical workers (ergotropic type of Hess, Graves' disease). They reach the limit of their cardiac efficiency with a low level of consumption even if trained to use the vagus as a spare part (protective measure) for better utilization of the oxygen in the blood and an adequate increase of the volume of the single heart beat (Histotropic type of Hess). In spite of this heart failure has never been observed, as it is with organic heart diseases, such as old vitium cordis and unrecognized endocarditis. Those patients usually do not complain much and occasionally decompensate acutely if subjected to special burdens. The majority of these vascular neurotic persons are absolutely fit for service and can often be trained together with healthy soldiers (class A-defect). Only very serious chronic tachycardia (the pulse has to be counted also at night) with a considerable general decrease of efficiency is to be judged as Class L-defect, on the basis of clinical judgement. They are to be evaluated in an observation hospital or a corresponding medical institution of the field army, to prevent their shirking service by a prolonged stay in a hospital. Even individuals with heart complaints caused by angina without anatomic causes, which occur very often among juveniles are fully fit for service. One must be careful not to overvalue insignificant electrocardiographic deviations such as slight lowering of the ST deflection in leads II and III (less than 1 millimeter), bow shaped transition of the S deflection to the ST deflection, negative T3 with high P2 if T3 rises with deep inspiration. Generally the electrocardiogram is overvalued and important diagnoses and corresponding evaluations should be deduced only from the EKG showing the physiological response to work.

Many deviations of the EKG may become retrogressive and need not be due to an irreparable lesion of the tissue.

Postinfectious instability of the circulation must be watched closely, especially with the younger soldiers, in order to prevent permanent damage. They appear after the usual infections, such as hepatitis, diarrhea, Volhynia-fever, tularaemia and above all after typhus. Hypertonia after typhus must be mentioned. It probably has a central origin, as also the not infrequent increase of blood pressure after diphtheria. It is these young soldiers who need careful medical treatment after infectious diseases, to prevent these young men who are still at the stage of adolescence from overwork. Postinfectious hypertonia of young people with a disposition to collapses must be mentioned. In the electrocardiogram the border-line pictures which I mentioned are to be found. The prolongation of the PQ interval is a frequent sign of a toxic heart involvement. If a decreasing PQ prolongation appears in the EKG on exercise with trained individuals, it is not to be considered as pathological. Young soldiers with postinfectious functional irregularities of the circulation should be released from hard work for three months. The findings should be checked during a period of three months.

Systolic murmurs are often misinterpreted. One ought to ascertain whether they disappear with deep inspiration or change their sound when the patient is recumbent, which will prove their accidental origin. Even the roentgenological measurements of the heart, must be regarded with discrimination. Not every large heart is diseased. The athletic heart caused by excessive sport activities in early youth is a symptom (pay attention to the kind of sport). Heart complaints with persons with injured lungs are intelligible even if no abnormalities of the pleura appear in the X-ray, or abnormalities of the autonomic nerves can be demonstrated. If functional disturbances of a greater extent exist they are to be considered as a class L-defect. It is important to calm the men about the "ball in the chest" which is often very harmless.

Let me mention in conclusion the simple neurovegetative disturbances of the regulation of circulation:

1. The border-line cases of hyperthyroidism compared with the real picture of thyreotoxicosis and Graves' disease (situational hyperthyroidism considered as B 41).

2. The disposition to spontaneous hypoglycemia without direct primary hyperfunction of the pancreas which may appear in addition to bulemia during periods of weakness of a marked vasomotor character ($B15_2$)

3. Tetany syndrome without evidence of hyperfunction of the parathyroid glands. Often somewhat infantile young soldiers are concerned ($B15_2$)

4. Syncopal vasomotor attacks manifesting themselves by orthostatic collapses or cardiovascular syncope. The attacks are as a rule very rare and appear only after overstrain. According to the frequency of attacks they are to be considered as B or L defects.

If organic findings can be excluded after a thorough general and special cardiac examination, the physician has to realize the fact that every one has to do his duty by the community to his utmost. It is the large group of the less efficient that are often protected with unwarrantable lenience while war selects with the utmost cruelty the best of our people.

5. Circulatory disturbances.

Stabsarzt (Captain M.C.) Prof. RUEHL

Examinations of the circulation can be only a link in the general medical evaluation and presupposes a knowledge of the history and clinical, roentgenological and EKG findings. Their chief problem is - establishing the general capacity of the circulation as well as the functional differential diagnosis that is the differentiation of the disturbances caused by the heart from those caused by the vessels and the discovery of latent defects. The latter is important especially for deciding the question whether they are organic or functional.

The kind and the amount of the strain imposed have to correspond to the desired purpose. Customary work loads, such as physical work (in relation to the weight of the body) are as a rule to be preferred. An exact adjustment of the work load is impossible on principle. Any transitions are possible from the simple sitting up in bed to sprinting. Certain regulations may be given only for certain frequently returning purposes (e.g. enlistment and outpatient examination). The work load imposed most not be too small (30 to 40 knee-bends, or running up and down a staircase of 10 Meters length twice a minute).

It is important to consider the patient's attitude towards the strain of daily life (history) also the observations during gymnastic or military exercise. Thus an impression of the processes is obtained which will complete the momentary impression derived from examination of the circulation.

The processes of circulation and respiration which occur with the simple strain of physical work are so complicated that their evaluation requires the greatest caution. Above all the extraordinary influence of the vegetative nervous system is to be considered and this is particularly strong during the usual short test. External influences (lack of sleep, nicotine, fever etc.,) and psychic factors play an important part. The factor of training may have a decisive effect. Therefore we are justified in speaking rather of an examination of the regulation of the circulatory nerves than

of an examination of the function of the heart. We point out the importance of repeated attempts to differentiate the nervous influences .

It is correct to call cyanosis and dyspnoea after work an indirect sign of a disturbed general circulation (aside from nervous tachypnoea) when pulmonary factors e.g. emphysema, are excluded. Also, observation of the general attitude especially of the expression of the face are of importance. Ascertaining how long the patient can hold his breath after deep inspiration has the disadvantage that it depends on the will-power of the subject and can therefore be used for military purposes only under certain conditions.

Decreasing or constant blood pressure with increasing frequent pulse at the same time is to be considered as poor or uneconomic action of the heart. Steady deep inspiration and frequent pulse after work are signs of an absence of work economy.

Nervous factors have such an important influence on the height of blood pressure, that a calculation of the quotients from percentage changes of amplitude and frequency as a basis for judgement is to be denied. A venous stagnation (with insufficiency of the left heart it can be recognized by decrease of vital capacity after work) can be ascertained only after a genuine failure of the heart while an evaluation of the values of the vital capacity has to take into consideration the psychogenic factors.

It seems doubtful whether the variations shown in the work kymograms (enlargement of the silhouette of the heart with a reduction of the deflections and a change from type I to type II according to STUMPF) may be utilized for evaluating heart conditions concerning whose nature one is not certain apart from the technical difficulties. These doubts are due to the nervous influences on the muscle contractions of the heart and to the uncertainty about the decision as to what is to be considered as the normal state.

The usual strain of work, with a measurement of the blood pressure and observation of the inspiration may be combined profitably with the making of an electrocardiogram during work. It is sufficient to ascertain the values shown by the EKG, three or five minutes after work, according to the directions on EKGs. The EKG during work is without doubt one of the most important practical function tests. It is,however, able to demonstrate only latent defects (e.g. coronary insufficiency or myocardia) but it never shows anything about the efficiency of the heart because its contour is only the manifestation of a process of excitement. A critical judgement of the EKG findings is very important because of the usual overvaluation. Changes which are caused by frequency must not be considered as symptoms of disease. Prolongations of PQ after work, enlargement of QRS in the form of intraventricular disturbances of the conduction mechanism (the utilization method of

Schellong is of no use for practical purposes) frequent appearance of extrasystoles especially those with different origin of the stimulus and certain ST downward deflections (more than 1 millimeter with normal gauging) are to be regarded as pathological. Most is the ST downward deflection in leads I and II, as well as in leads II and III with a right deflection (Rechtstyp) at the same time not only in lead III. Marked T flattenings or iso-electric T are to be considered as pathological only in leads I and II. The seriousness of the EKG changes can be used only under certain conditions as a basis for judging the degree of anatomic lesion. It is of great general importance that changes based on electrocardiographic findings alone never justify the diagnosis of coronary insufficiency or myocardia. As a matter of principle the diagnosis shall depend altogether on the general clinical decisions and shall not be established by the physician who judges the findings of the EKG.

The influence of nervous factors is to be recognized also for the EKG under work load which can be proved very distinctly in the EKG in cases of so-called orthostatic strain. I think that the ST downward deflection occurring with it are no manifestation of disturbed blood circulation in the coronary arteries nor are they due to haemodynamic causes. They depend also only partly on frequency. Their disappearance after the administration of Gynergen justifies the supposition that they are only nervous vegetative changes in the contour of the EKG. The EKG under anoxia has so far been only of theoretical importance as a test of functions. A practical wider application is made difficult by uncertainty about the limits of the normal state and by doubts about the harmlessness of the method if practised by unexperienced persons.

Besides the tests of the functions of the whole circulation and of the heart, another equally valuable field of circulatory examination is to be mentioned which is unfortunately often neglected, namely the testing of the function of the peripheral circulation. Those methods which make it possible to test the peripheral circulation independent of the efficiency of the heart (Schellong test) with recording the systolic-diastolic blood pressure and pulse frequency immediately , 2 and five minutes after simple (active) standing up is recommended for practice. Greater lowering of the diastolic as well as the systolic blood pressure (more than 20 millimeters) indicates a pathological disturbance of the regulation of the peripheral vessels. It must, however, be pointed out that such pathological hypodynamic or hypotonic disturbances of the regulation as well as orthostatic collapses are to be observed comparatively seldom, because the strain is too weak.

To increase the strain on the peripheral circulation, a special method has been developed which consists in having the patient stand up ten minutes after an injection of 1 milligram of histamine combining thus the mere orthostatic mechanical strain with a dilation of the capillaries of the patients (measuring blood pressure and the frequency of the pulse up to ten minutes after standing up). The criterion for judgement is the following collapse itself. This method

has proved useful for estimating the predisposition for collapse. Pathological collapse reactions were found most often with injuries due to infection from pneumonia during convalescence from focal toxicosis as well as with a hypotonic complex of symptoms, but not with psychogenic collapses. The method, however, still requires a more widespread experience and cannot yet be used in the army.

The preceding report had to be confined to the simple tests of the function of the circulation as practicable in army hospitals. Regulations are practically impossible. In every single case the general medical judgement is decisive.

Discussion of the reports concerning Evaluation of non-organic heart diseases, Vegetative disturbances of the regulation of circulation (post-infective and other types) and Tests of Circulatory function.

KOHBROCK: The cases of latent typhus without a rash which are not detected in the army and without direct clinical symptoms indicating a simple infection are now more frequent. They concern patients who are sent to the hospitals with subjective heart complaints. We find with them objectively, not only insufficiency of the peripheral circulation but above all insufficiency of the heart muscle associated with the complaints of a coronary insufficiency. Roentgenology and electrocardiography give us no information either at rest or after work. Often a specific sounding second tone of the aorta indicates a progressing aortitis while in some cases this second tone of the aorta is almost a sign that the patient has had typhus. The WEIL-FELIX reaction will then confirm the supposition. Altogether the number of patients with latent tyhpus seems to be greater than is often supposed. Some cases of peripheral paralysis of unknown etiology at first or such cases as showed persistently recurring low temperature who had had influenza or even angina in the army were found to have a positive WEIL-FELIX reaction of at least 1:200.

GUTZEIT: For the diagnosis of non-organic disorders of the circulation, the record and the general impression made by patients are much more important than any single symptom. The younger and inexperienced medical staff officers need constant instruction and training in this respect. It is of psychological importance to not give the patients any information about the diagnosis of symptoms (EKG, blood pressure) and in case of unimportant symptoms or absence of objective findings to declare that the person examined is in sound health.

BOHNENKAMP: All doctors agree that no adequate diagnosis can be based on single EKG findings or roentgenological finding alone in case of non-organic disorders of the heart and circulation. But the group of inefficient soldiers having pronounced disorders of the circulation whether isolated or general disorders of the central machanism (change of stumpf type I to type II etc.,) is to be regarded with suspicion and should be followed up to be evaluated by the use of every available clinical method and exercise test

including EKG, roentgenology and especially roentgen-kymography and the determination of the time for tension and relaxation according to Blumberger. Impressive experiences are reported. A physician in good physical condition and an excellent sportsman who had been observed for a long time developed a block in conduction after short service in the war though his EKG showed an alteration which had been considered as insignificant etc.

BOCK: There is no standard simple method of testing the function of the circulation. In the general range of a complete clinical picture, the time of circulation is to be ascertained, especially the difference between the period of action of decholin minus the period of action of ether. This enables us to measure the efficiency of the left ventricle. The standard value is not above seven seconds. An increase of the decholin-ether difference indicates a poor propelling efficiency of the left ventricle (further particulars about ether decholin fluorescence process of BOCK and FINK are given in the Congress report of the Deutsche Gesellschaft fuer Innere Medizin, Wiesbaden, 1936).

The following statements apply to all stand-up tests as functional tests. Anybody may have an orthostatic collapse. It depends on the manner of standing. Deeper inspiration and slight movements of the leg muscles will further the venous reflex considerably and delay or avoid collapses considerably. The conditions for such tests must follow certain strict rules.

SCHULTEN: A differentiation of local heart disorders and vegetative disorders of the regulation of the circulation is of practical importance. Many physicians even specialists, recognize only the former which are in reality rather scarce. Only the heart disorders e.g. after diphtheria are to be regarded as more serious. A great number of patients with disorders of the regulations are fit for service and are to be judged strictly.

VOLHARD: Do you not think gentlemen that it would benefit these vegetatively unstable persons more than a hospital treatment if they could live in the same surroundings as these here in Hohenlychen. If they could have such an excellent treatment with slowly increasing strain by gymnastics and sports under such an experienced leader, I do not doubt that we should succeed in improving their constitution and in making their heart and circulation more efficient.

GUTZEIT: I should not treat patients with functional non-organic heart complaints, except chronic tachycardia and postinfective symptoms of weariness, in hospitals, but discharge them as fit for service. Experience teaches us that in spite of my efforts for years to carry our exercise and work therapy it is not carried out in most hospitals and that the patients in convalescent homes get better only if strict medical control is guaranteed, but in the most cases the latter is lacking.

ANTHONY: With men in the Air Force too we find disturbances of the regulation of the circulation after great strain. A treatment in convalescent homes or hospitals carried out sufficiently early which lays a special stress on athletics and sport proved to be very effective for the purpose of making the patients fit for active service within a short time.

DELIUS: As to non-organic heart and circulatory diseases, it is recommended to differentiate between localized heart complaints or disorders and disorders of the regulatory mechanism. The latter can be classified etiologically as infectious, toxicologic and constitutional cases and those due to old age. In a pathogenic respect, no heart disease but only functional disorders of the vegetative system are to be supposed. This has been proved by experiments. In a symptomatologic respect, we distinguish between hypertonic, hypotonic and normotonic disturbances of the control mechanism. The hypertonic ones are similar to the complex of symptoms of thyreotoxicosis. Hypotonic disturbances of the control mechanism, perhaps hyposympathicotonia, are frequent with old men in the form of extreme exhaustion. They are vagatonies causing general inefficiency. Normotonic or poikilotonic disturbances of the control mechanism are difficult to determine by blood pressure and pulse records but in most cases they are easy to ascertain by stand-up tests by keeping a record of the electrocardiograph and the reaction of the blood pressure. The orthostatic changes in the shape of the EKG are certainly due to the influence of the heart nerves. In pathogenic respect it is perhaps a case of vasomotor coronary insufficiency. We know they can be influenced pharmacologically.

For purposes of evaluation it is to be recommended that patients with postinfective disturbances of the regulation and some other hypotonic disturbances of the regulation appearing as extreme exhaustion, be treated temporarily with consideration and to exercise them in a cautious way. Some pronounced constitutional disturbances of the regulation mostly hypertonic, are to be considered as chronic with typical "failures". They are to be classified as fit under certain conditions. The other disturbances of the regulation can be judged as class A-defect.

BANSI : For particularly serious constant tachycardia with considerable restriction of activity an evaluation as an L 49 deficiency should be possible in an observation ward or a corresponding hospital department of the army. Postinfective circulatory instability is to be judged as L 49 for 8 weeks and even up to 3 months.

RUHL: I am pleased to see that we all agree that the EKG deflections in the stand-up test are of vegetative nervous origin and unimportant. The effect of the O_2 deficiency test makes us deny a coronary insufficiency. The Gynergen test cannot be carried out in a military environment. The histamine-stand-up test cannot cause heart damage as the dose of histamine (1 milligram) is too small. The Jarisch-Bezold effect is not at all likely to cause heart damage.

The determination of the time for circulation yields useful results only in case of pronounced insufficiency. The tests of the function of the circulation have their proper use in border-line cases.

General Directions about:

a. Frequent non-organic heart diseases and vegetative disturbances of the regulation. Functional disturbances of the circulation without organic findings are extremely frequent. I suggest the following discrimination for practical purposes:

a) Essential hypertonia without involvement of the heart and without kidney findings are to be classified according to deficiency B 49. The unstable increase of blood pressure of juveniles due to the vegetative system of juveniles are to be classified as a class A 49 deficiency.

b) Ventricular extrasystole is harmless if it disappears after exertion (A 49). Multiocular, ventricular and supraventricular extrasystole may be a sign of myocarditis (focal toxicosis) and should be given a preliminary classification as L 49 with secondary examination after 3 months. Paroxysmal tachycardia is to be regarded as a class B or L defect according to the frequency of attacks even without organic heart findings.

c) Cases of vasoneurosis, also those with anginoid complaints, are to be considered as class A-defects. Only the rare cases with chronic tachycardia (above 120 pulse beats) persisting after long rest with a considerable limitation of efficiency can be judged as a class L defect in an observation ward or corresponding department of the army. Soldiers with tachycardia caused by increased sympathicotonia are less efficient and hard to train, but do not suffer from heart disease. They are fit for service (A 49)

d) Every infectious disease may leave behind a circulatory instability which disappears after weeks or months and needs careful control. A reexamination after three months at the latest should be routine.

Systolic noises which are loudest above the pulmonary area and become louder with deep inspiration or in recumbent position and which disappear nearly or completely with deep exhalation or on standing up are accidental and unimportant. A moderate dilatation of the heart in the X-ray without clinical findings is frequent and is not caused by an enlargement of the heart (athletic heart of the sportsman).

e) Heart complaints after injuries to the lungs, also without organization of the pleuropericarditis, are caused by irritation of the vagus or symphaticus (disposition for extrasystole and fainting fits), and should be classified according to L49 but only if a considerable functional disorder exists

If vegetatively unstable patients are hard to train they are to be transferred to hospitals for patients with slight disorders and with work therapy.

b. Tests of the Function of the Circulation. Test of the function of the circulation can only be a link in the general medical judgement and must be based on the record of the disease and on clinical roentgenogical and EKG findings.

Their tasks are the following:

To determine the limits of the capacity of the circulation to bear strain and to discover latent defects by functional differential diagnosis. A constant test load is impossible. Special norms can be fixed only for particular frequently recurring purposes in which case too slight a strain upon muscular exertion should not be chosen. The attitude during the strain of daily work and sport are also to be considered.

The circulation and respiratory processes depend so much on the vegetative nervous system (psychic and external influences, training factor) that we can only with extreme caution infer a lack of efficiency of the organs from the result of a test of the function.

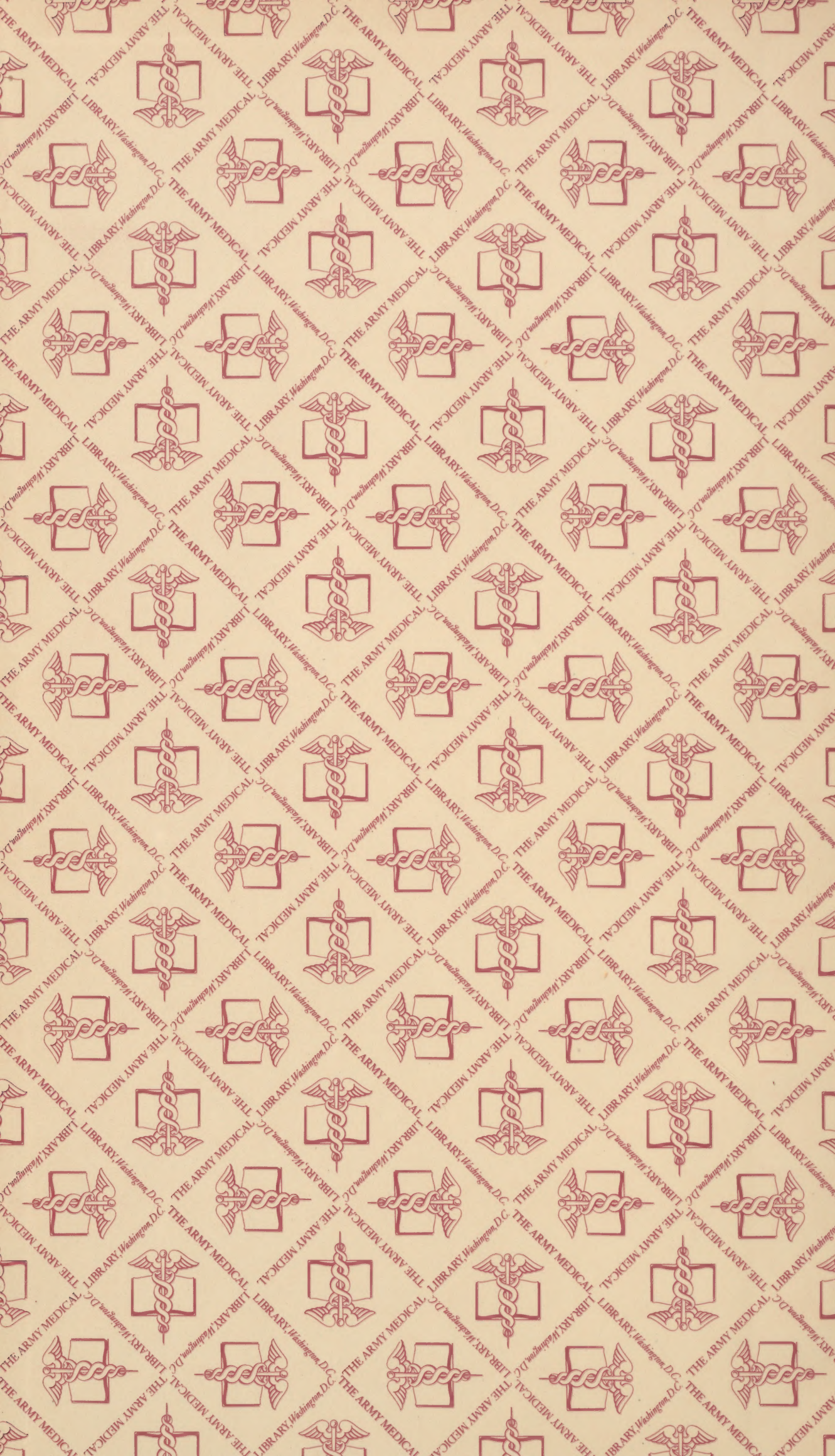
The respiration as an indirect symptom of a disturbed efficiency of the general circulation, as well as cyanosis and dyspnoea are useful symptoms besides observation of the general attitude (expression of the face of the exhausted patient). The measurement of the length of time a patient is able to hold his breath after deep inspiration can be used only under certain conditions.

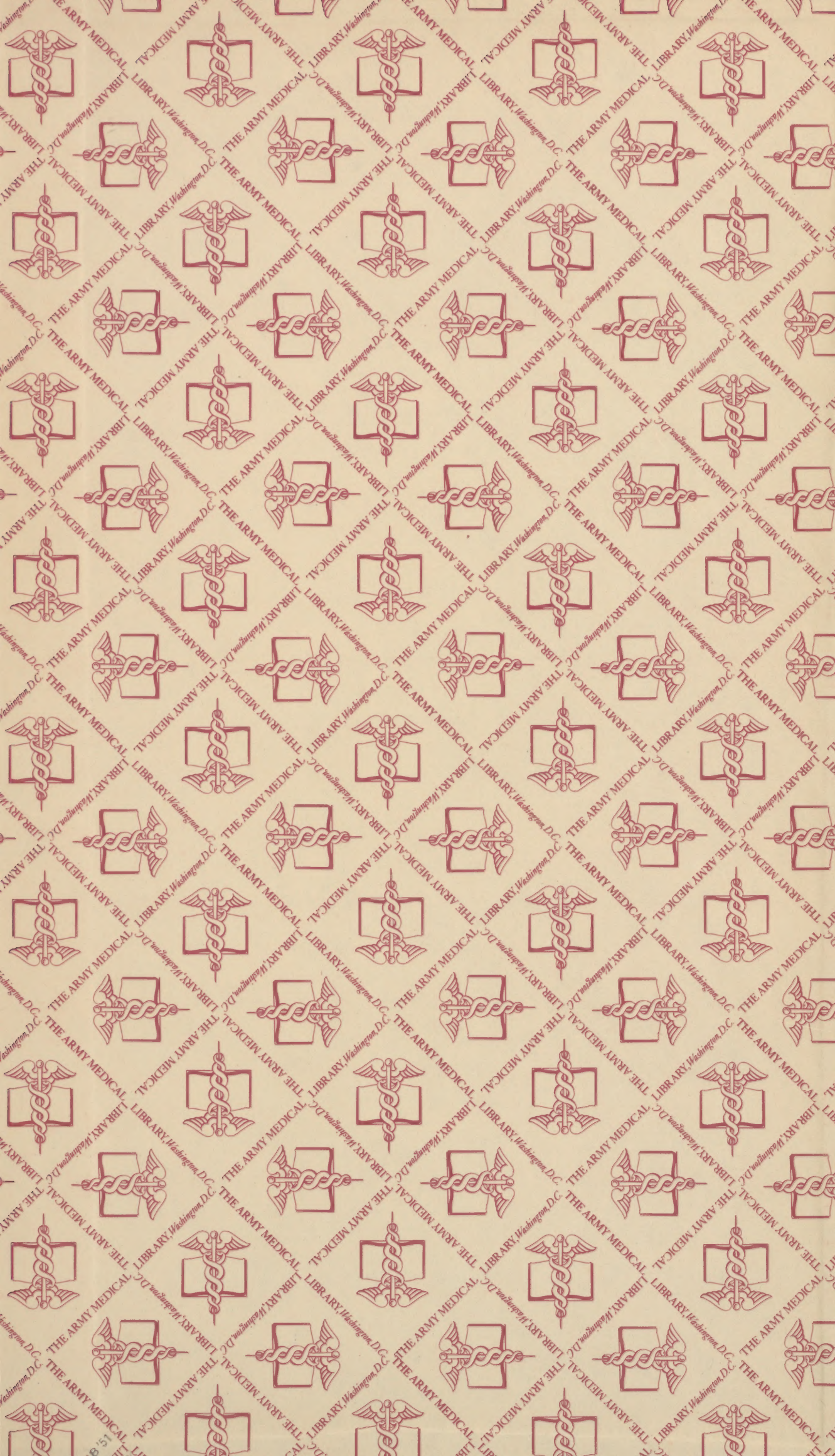
If the amplitude of the blood pressure becomes smaller or remains the same, uneconomical heart efficiency may be supposed. Continued rapid breathing and pulse rate is a symptom of poor work economy. Calculation of quotients out of percentual changes of amplitude and frequency as a basis for evaluation is rejected.

The usual strain by work may be combined profitably with the making of an EKG during work. Though the latter gives no indication of the efficiency of the heart, because its shape is

only an expression of a process of stimulation it is important that electrocardiographic diagnosis should be based on a general examination by a specialist and not be made only by the doctor who reads the EKG.

For testing the regulation of the peripheral circulation an orthostatic strain such as the stand-up test is to be recommended. A considerable lowering especially of the diastolic as well as the systolic blood pressure (more than 20 millimeters), indicates a pathological disturbance of the peripheral regulation.


THE ARMY MEDICAL LIBRARY, Washington, D.C.


THE ARMY MEDICAL LIBRARY, Washington, D.C.